

# Stephen D. Turner, Ph.D.

Assistant Professor of Public Health Sciences  
Bioinformatics Core Director  
University of Virginia School of Medicine  
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## SUMMARY

I am faculty in the department of Public Health Sciences and founding director of the UVA School of Medicine Bioinformatics Core, established in 2011. I provide expert bioinformatics, biostatistics, computational biology, and genomics-related data science consulting services, working closely with collaborators in the experimental design and analysis of genome-scale research. With a combined background in biomedical research, statistics, and scientific computing, my expertise lies in managing, manipulating, and analyzing large-scale high-dimensional data, and in working with collaborators to turn large data into biomedical insight.

## EDUCATION

Ph.D.	Human Genetics	Vanderbilt University, Nashville TN
M.S.	Applied Statistics	Vanderbilt University, Nashville TN
B.S.	Biology	James Madison University, Harrisonburg VA

## PROFESSIONAL EXPERIENCE

2011-present	Bioinformatics Core Director Assistant Professor of Public Health Sciences University of Virginia School of Medicine, Charlottesville VA
2011-2011	Postdoctoral Research Fellow University of Hawaii Cancer Center, Honolulu, HI
2006-2010	Graduate Research Fellow Vanderbilt University Center for Human Genetics Research, Nashville TN
2002-2006	Research Assistant James Madison University Biology Department, Harrisonburg VA

## OTHER QUALIFICATIONS & PROFESSIONAL ACTIVITIES

2013-present	U.S. Government Security Clearance
2010-present	Registered U.S. Patent Agent
2010-present	Faculty of 1000

## RESEARCH INTERESTS

NGS data analysis	RNA-seq	High-throughput biology
Metagenomics	Human & Microbial Forensics	Biodefense
Bioinformatics & Biostatistics	Bioinformatics-as-a-Service	Reproducibility
Scientific computing education	Patent Law	Data Science

**FUNDING***ACTIVE FUNDING*

**Subcontract to DoD** 2017-2022 Subcontract  
*Title:* Bioinformatics/Forensics Subject Matter Expert Support  
*Role:* Principal investigator

**Subcontract to DHS** 2017- Subcontract  
*Title:* Bioinformatics & Microbial Forensics Subject Matter Expert Support  
*Role:* Principal investigator

**Subcontract to IARPA** 2017- Subcontract  
*Title:* Bioinformatics Subject Matter Expert Support  
*Role:* Principal investigator

**4-VA Collaborative Research Grant** 2017- State  
*Title:* Genomic Analysis Of Transmissible Multi-Drug Antibiotic Resistance  
*Role:* Co-PI

*COMPLETED FUNDING*

**Subcontract to DoD** 2015-2017 Subcontract  
*Title:* Bioinformatics/Forensics Subject Matter Expert Support  
*Role:* Principal investigator

**4-VA Collaborative Research Grant** 2017 State  
*Title:* A Virginia Collaborative Effort to Analyze Genomes of Whooping Cough Bacteria  
*Role:* Co-investigator

**Subcontract to DoD** 2012-2015 Subcontract  
*Title:* Bioinformatics Subject Matter Expert Support  
*Role:* Principal investigator

**4-VA mini-grant** 2014-2015 Institutional  
*Title:* Gene expression analysis in the developing vertebrate retina using next generation sequencing  
*Role:* Co-principal investigator

**4-VA mini-grant** 2013-2015 Institutional  
*Title:* Genomic analysis of multi-drug antibiotic resistance encoded on mobile genetic elements in Virginia stream bacterial populations  
*Role:* Co-principal investigator

**DoD Army Research Office (Hewlett)** 2012-2013 DoD / ARO  
*Title:* Identifying a Path Towards Rapid Discrimination of infection Disease Outbreaks  
*Role:* Co-investigator

**F31 NS066638-01/02 (Turner)** 2009-2011 NIH/NINDS  
*Title:* Genomewide Analysis of Interactions in Alzheimer Disease Using Neural Networks  
*Role:* Principal investigator

**T32 GM080178 (Haines)** 2007-2009 NIH/NIGMS  
*Title:* Training Program on Genetic Variation and Human Phenotypes  
*Role:* Trainee

## PUBLICATIONS

- Shi Y, Stornetta R, Stornetta D, Onengut-Gumuscu S, Farber E, **Turner SD**, Guyenet P, Bayliss D. Neuromedin B expression defines the mouse retrotrapezoid nucleus. *Journal of Neuroscience* (2017). In press. IF=5.924.
- Zhang Y, Cruickshanks N, Yuan F, Wang B, Pahuski M, Wulfkuhle J, Gallagher I, Koeppel AF, Hatef S, Papanicolas C, Lee J, Bar EE, Schiff D, **Turner SD**, Petricoin EF, Gray LS, Abounader, R. Targetable T-type calcium channels drive glioblastoma. *Cancer Research* (2017). DOI:10.1158/0008-5472.CAN-16-2347. PMID:28512247. IF=9.329.
- Operario DJ, Koeppel AF, **Turner SD**, Bao Y, Pholwat S, Banu S, Foongladda S, Mpagama S, Gratz J, Ogarkov O, Zhadova S, Heysell SK, Houtpeter ER. Prevalence and extent of heteroresistance by next generation sequencing of multidrug-resistant tuberculosis. *PLoS ONE* (2017). 12(5):e0176522. DOI:10.1371/journal.pone.0176522. PMID:28545050. IF=3.234.
- Brautigan DL, Li R, Kubicka E, **Turner SD**, Garcia JS, Weintraub ML, Wong EA. Lysolecithin as feed additive enhances collagen expression and villus length in the jejunum of broiler chickens. *Poultry Science* (2017) pex078. DOI:10.3382/ps/pex078. PMID:28444343. IF=1.672.
- Anderson AE, Taniguchi K, Hao Y, Melhuish TA, Shah A, **Turner SD**, Sutherland AE, Wotton D. Tgif1 and Tgif2 repress expression of the RabGAP Evi5l. *Molecular and Cell Biology* (2016) 37 (5) e00527-16. DOI:10.1128/MCB.00527-16. PMID:27956704. IF=4.427.
- Langouet-Astrie C, Meinsen A, Grunwald E, **Turner SD**, Enke R. RNA sequencing analysis of the developing chicken retina. *Nature Scientific Data* (2016) 3:160117. DOI: 10.1038/sdata.2016.117. PMID: 27996968.
- Houssin NS, Bharathan NK, **Turner SD**, Dickinson AJG. The role of JNK during buccopharyngeal membrane perforation, the last step of embryonic mouth formation. *Developmental dynamics* (2016). 246:100-115. DOI: 10.1002/dvdy.24470. PMID:28032936. IF=2.233.
- Han CZ, Juncadella IJ, Kinchen JM, Buckley MW, Klibanov AL, Dryden K, Onengut-Gumuscu S, Erdbrugger U, **Turner SD**, Shim YM, Tung SK, Ravichandran KS. Macrophages redirect phagocytosis by non-professional phagocytes and influence inflammation. *Nature* (2016) 539:570-574. DOI:10.1038/nature20141. PMID:27820945. IF=38.138.
- Tan S, Liu X, Fox T, Barth B, Sharma A, **Turner SD**, Awwad A, Dewey A, Doi K, Spitzer B, Shah M, Morad S, Desai D, Amin S, Zhu J, Liao J, Yun J, Kester M, Claxton D, Wang H, Cabot M, Schuchman E, Levine R, Feith D, Loughran T. Acid ceramidase is upregulated in AML and represents a novel therapeutic target. *Oncotarget* (2016). 7(50):83208-83222. DOI:10.18632/oncotarget.13079. PMID:27825124. IF=6.359.
- Filiano AJ, Xu Y, Tustison NJ, Marsh RL, Baker W, Smirnov I, Overall CC, Gadani SP, **Turner SD**, Weng Z, Peerzade SN, Chen H, Lee KS, Scott MM, Beenhakker MP, Litvak V, Kipnis J. Unexpected role of interferon-gamma in regulating neuronal connectivity and social behaviour. *Nature* (2016) 535:425-429. PMID:27409813. IF=38.138.
- Arambula SE, Belcher SM, Planchart A, **Turner SD**, Patisaul HB. Impact of Low Dose Oral Exposure to Bisphenol A (BPA) on the Neonatal Rat Hypothalamic and Hippocampal Transcriptome: A CLARITY-BPA Consortium Study. *Endocrinology* (2016) 157:3856-3872. PMID:27571134. IF= 4.498.
- Cherepanova OA, Gomez D, Shankman LS, Swiatlowska P, Williams J, Sarmiento OF, Alencar GF, Hess DL, Bevard MH, Greene ES, Murgai M, **Turner SD**, Geng Yong-Jian, Bekiranov S, Connelly JJ, Tomilin A, Owens GK. Activation of the ESC pluripotency factor OCT4 in smooth muscle cells is atheroprotective. *Nature Medicine* (2016). 22:657-665. PMID:27183216. IF=27.363.

- Barrett MJ, Koeppl AF, Flanigan JL, **Turner SD**, Worrall BB. Investigation of Genetic Variants Associated with Alzheimer Disease in Parkinson Disease Cognition. *J Parkinsons Dis* (2016) 6:119-124. [PMID:26889634](#). IF=1.90.
- Li R, **Turner SD**, Brautigan DL. Xanthophylls lutein and zeaxanthin modify gene expression and induce synthesis of hyaluronan in keratinocyte model of human skin. *Biochemistry and Biophysics Reports* (2015). DOI: doi:10.1016/j.bbrep.2015.08.012.
- Gilchrist CA, **Turner SD**, Riley MF, Petri WA Jr, Hewlett EL. Whole-Genome Sequencing in Outbreak Analysis. *Clinical Microbiology Reviews* (2015). 3:541-563. [PMID:25876885](#). IF=17.406.
- Cronk JC, Derecki NC, Ji E, Xu Y, Lampano AE, Smirnov I, Baker W, Norris GT, Marin I, Coddington N, Wolf Y, **Turner SD**, Aderem A, Klibanov AL, Harris TH, Jung S, Litvak V, Kipnis J. Methyl-CpG Binding Protein 2 Regulates Microglia and Macrophage Gene Expression in Response to Inflammatory Stimuli. *Immunity* (2015). 42:679-91. [PMID:25902482](#). IF=21.561.
- Mathers AJ, Stoesser N, Sheppard AE, Pankhurst L, Geiss A, Yeh AJ, Didelot X, **Turner SD**, Sebra R, Kasarskis A, Peto T, Crook D, Sifri CD. *Klebsiella pneumoniae* carbapenemase (KPC) producing *K. pneumoniae* at a Single Institution: Insights into Endemicity from Whole Genome Sequencing. *Antimicrobial Agents and Chemotherapy* (2015). 3:1656-63. [PMID:25561339](#). IF=4.476.
- Barbery CE, Celigoj FA, **Turner SD**, Smith RP, Kavoussi PK, Annex BH, Lysiak JJ. Alterations in microRNA Expression in a Murine model of Diet-Induced Vasculogenic Erectile Dysfunction. *Journal of Sexual Medicine* (2015). 3:621-630. [PMID:25533598](#). IF=3.151.
- Hurney CA, Babcock SK, Shook DR, Pelletier TM, **Turner SD**, Maturo J, Cogbill S, Snow MC, Kinch K. Normal table of embryonic development in the four-toed salamander, *Hemidactylium scutatum*. *Mechanisms of Development* (2015). 136:99-110. [PMID:25617760](#). IF=2.440.
- Ritchie M, Verma S, Hall M, Goodloe R, Berg R, Carrell D, Carlson C, Chen L, Crosslink D, Denny J, Jarvik G, Li R, Lineman J, Pathak J, Peissig P, Rasmussen L, Ramirez A, Wang X, Wilke R, Wolf W, Torstenson E, **Turner SD**, Mccarty C. Electronic medical records and genomics (eMERGE) network exploration in cataract: several new potential susceptibility loci. *Molecular Vision* (2014). 20:1281-95. [PMID:25352737](#). IF=1.986.
- Giorgi EE, Stram DO, Taverna D, **Turner SD**, Schumacker F, Haiman CA, Lum-Jones A, Tirikainen M, Caberto C, Duggan D, Henderson BE, Le Marchand L, Cheng I. Fine-mapping IGF1 and prostate cancer risk in African Americans: The Multiethnic Cohort Study. *Cancer Epidemiology, Biomarkers & Prevention* (2014). doi:10.1158/1055-9965.EPI-14-0333. [PMID:24904019](#). IF=4.125.
- Budowle B, Connell N, Bielecka-Oder A, Colwell R, Corbett C, Fletcher J, Forsman M, Kadavy D, Markotic A, Morse S, Murch R, Sajantila A, Schmedes S, Ternus K, **Turner SD**, Minot S. Validation of High Throughput Sequencing and Microbial Forensics Applications. *Investigative Genetics* 5:9 (2014) doi:10.1186/2041-2223-5-9. IF=N/A.
- Allen EK, Koeppl AF, Hendley JO, **Turner SD**, Winther B, Sale MM. Characterization of the nasopharyngeal microbiota in health and during rhinovirus challenge. *Microbiome* 2:22 (2014) doi:10.1186/2049-2618-2-22. [PMID:25028608](#). IF=N/A.
- Song W, Mondal P, Wolfe A, Alonso LC, Stamateris R, Ong BWT, Lim OC, Yang KS, Radovick S, Novaira HJ, Farber EA, Farber CR, **Turner SD**, Hussain MA. Glucagon Regulates Hepatic Kisspeptin to Impair Insulin Secretion. *Cell Metabolism* 19(4):667-681 (2014). [PMID:24703698](#). IF=17.565.
- Belyea B, Xu F, Pentz E, Medrano S, Li M, Hu Y, **Turner SD**, Legallo R, Jones C, Tario J, Liang P, Gross K, Sequeira-Lopez, ML, Gomez AR. Identification of renin progenitors in the mouse bone marrow that give rise to B-cell leukaemia. *Nature Communications* 5:3273 (2014). [PMID:24549417](#). IF=11.470.

Prince J, Lundgren A, Stadnisky MD, Nash WT, Beeber A, **Turner SD**, Brown MG. Multiparametric Analysis of Host Response to Murine Cytomegalovirus in MHC Class I-Disparate Mice Reveals Primacy of D<sup>K</sup>-Licensed Ly49G<sub>2</sub><sup>+</sup> NK Cells in Viral Control. *Journal of Immunology* 191:4709-19 (2013). [PMID:24068668](#). IF=4.92.

Scian MJ, Maluf DG, Archer KJ, **Turner SD**, Suh JL, David KG, King AL, Posner M, Brayman KL, Mas VR. Identification of Biomarkers to Assess Organ Quality and Predict Post-Transplant Outcomes. *Transplantation*. 94(8): 1-8 (2012). [PMID: 22992769](#). 3.535.

Lim U, **Turner SD**, Franke AA, Cooney RV, Wilkens LR, Ernst T, Albright CL, Novotny R, Chang L, Kolonel LN, Murphy SP, Le Marchand L. Predicting total, abdominal, visceral and hepatic adiposity with circulating biomarkers in caucasian and Japanese american women. *PLoS ONE*. 7(8):e43502 (2012). [PMID: 22912885](#). IF=3.234.

Zuvich RL, Armstrong LL, Bielinski S, Bradford Y, Carlson CS, Clayton E, Crawford DC, Crenshaw AT, de Andrede M, Doheny K, Haines JL, Hayes G, Jarvik G, Jiang L, Kullo I, Li R, Ling H, Matsumoto M, McCarty CA, McDavid AN, Mirel DB, Olson L, Paschall J, Pugh E, Rasmussen LV, Rasmussen-Torvik L, **Turner SD**, Wilke RA, Ritchie MD. Lessons learned in merged GWAS data in the eMERGE Network: Pitfalls of merging GWAS data: lessons learned in the eMERGE network and quality control procedures to maintain high data quality. *Genetic Epidemiology*. 35(8):887-898 (2011). [PMID:22125226](#). IF=3.441.

**Turner SD**, Ritchie MD, Berg D, Peissig P, Linneman J, McCarty CA, Wilke RA. Knowledge-Driven Multi-Locus Analysis Reveals Gene-Gene Interactions Influencing HDL Cholesterol Level in Two Independent EMR-Linked Biobanks. *PLoS ONE*. 6(5):e19586 (2011). [PMID: 21589926](#). IF=3.234.

**Turner SD**, Armstrong L, Bradford Y, Carlson C, Crawford DC, Crenshaw AT, de Andrede M, Doheny K, Haines JL, Hayes G, Jarvik G, Jiang L, Ling H, Kullo I, Li R, Manolio TA, Matsumoto M, McCarty CA, McDavid A, Mirel D, Paschall J, Pugh E, Rasmussen LV, Wilke RA, Zuvich RL, Ritchie MD. Quality Control procedures for Genome-Wide Association Studies. *Current Protocols in Human Genetics*. Chapter 1, Unit 1.19 (2011). [PMID:21234875](#).

**Turner SD**, Bush WS. A Multivariate Analysis of Regulatory SNPs: Empowering Personal Genomics by Considering Cis-Epistasis and Heterogeneity. *Pacific Symposium in Biocomputing* (2011). *Pac Symp Biocomput*. 2011:276-287 (2011). [PMID:21121055](#).

**Turner SD**, Dudek SM, Ritchie MD. ATHENA: A Knowledge-Based Hybrid Backpropagation-Grammatical Evolution Neural Network Algorithm for Discovering Epistasis among Quantitative Trait Loci. *BMC BioData Mining*. 3:5 (2010). [PMID:20875103](#). IF=2.024.

Zabaleta J, Camargo MC, Ritchie MD, Piazuelo MB, Sierra RA, **Turner SD**, Delgado A, Fonham ETH, Schneider BG, Correa P, Ochoa AC. Association of haplotypes of inflammation-related genes with gastric preneoplastic lesions in African Americans and Caucasians. *International Journal of Cancer*. 128(3):668-675 (2011). [PMID:20473875](#). IF=5.085.

**Turner SD**, Dudek SM, Ritchie MD. Incorporating Domain Knowledge into Evolutionary Computing for Discovering Gene-Gene Interaction. *11<sup>th</sup> Int'l Conference on Parallel Problem Solving From Nature (PPSN), Lecture Notes in Computer Science*. 6238(l):394-403 (2010).

Holzinger ER, Buchanan C, **Turner SD**, Dudek SM, Torstenson ES, Ritchie MD. Initialization Parameter Sweep in ATHENA: Optimizing Neural Networks for Detecting Gene-Gene Interactions in the Presence of Small Main Effects. *Genetic and Evolutionary Computation Conference – GECCO 2010*: 203-210. ACM Press (2010).

**Turner SD**, Dudek SK, Ritchie MD. Grammatical Evolution of Neural Networks for Discovering Epistasis among Quantitative Trait Loci. *Lecture Notes in Computer Science*. 6023:86-97 (2010).

Edwards TS, **Turner SD**, Torstenson E, Dudek SM, Martin ER, Ritchie MD. A General Framework for Formal Tests of Interaction after Exhaustive Search Methods with Applications to MDR and MDR-PDT. *PLoS One*. 5(2):e9363 (2010). [PMID: 20186329](#). IF=3.234.

**Turner SD**, Crawford DC, Ritchie MD. Methods for optimizing statistical analyses in pharmacogenomics research. *Expert Reviews in Clinical Pharmacology*. 2(5):559-570 (2009). [PMID: 20221410](#). IF=2.180.

**Turner SD**, Ritchie MD, Bush WS. Conquering the Needle-in-a-Haystack: How Correlated Input Variables Beneficially Alter the Fitness Landscape for Neural Networks. *Lecture Notes in Computer Science*. 5483:80-91 (2009).

Edwards TL, Bush WS, **Turner SD**, Dudek SM, Torstenson E, Schmidt M, Martin ER, Ritchie MD. Generating linkage disequilibrium patterns in data simulations using GenomeSIMLA. *Lecture Notes in Computer Science*. 4973:24-35 (2008).

## Preprints

Minot S, **Turner SD**, Ternus KL, Kadavy DR. SIANN: Strain Identification by Alignment to Near Neighbors. *bioRxiv* DOI: <http://dx.doi.org/10.1101/001727>

**Turner SD**. qqman: an R package for visualizing GWAS results using Q-Q and manhattan plots. *bioRxiv* DOI: <http://dx.doi.org/10.1101/005165>

## TEACHING & OUTREACH

Data Science Course Organizer & Instructor for Translational Health Research Institute of Virginia, Fall 2017. *Introduction to Biomedical Data Science for Translational Health Research*. ([bioconnector.org/workshops/thriv](http://bioconnector.org/workshops/thriv))

Graduate course: BIMS8382, Spring 2017. (Online: [bioconnector.org/workshops/bims8382](http://bioconnector.org/workshops/bims8382)). *Introduction to Biomedical Data Science*.

Instructor & organizer for 2016 Bioconnector workshop series, Fall 2016. (Online: [bioconnector.org/workshops](http://bioconnector.org/workshops)). *Essential statistics with R, Survival Analysis with TCGA Data, RNA-seq Data Analysis*

Graduate course: BIMS8382, Spring 2016. (Online: [bioconnector.org/bims8382](http://bioconnector.org/bims8382)). *Introduction to Biomedical Data Science*.

Instructor & organizer: R for the life sciences workshop series, Spring 2015. ([bioconnector.org/workshops2015](http://bioconnector.org/workshops2015)). *Introduction to R for Life Scientists; Advanced data manipulation; Advanced data visualization*.

Instructor & organizer: RNA-seq data analysis bootcamp, 3/23/2015-3/26/2015  
*Introduction to Linux, cloud computing, genomic analysis, statistics with R*.

Instructor, Cold Spring Harbor Laboratory DNA Learning Center, 6/9/2015-6/10/2015.  
*RNA-seq quality control and analysis of differential gene expression*.

Co-instructor / organizer, Software Carpentry Bootcamp, 4/15/2015-4/16/2015.  
*Software Carpentry (2-day computing skills bootcamp)*

Instructor, Statistical Computing Workshop, 3/18/2014  
*Introduction to R for Life Scientists*

Instructor, Software Carpentry Bootcamp, 3/10/2014 – 3/11/2014  
*Software Carpentry (2-day computing skills bootcamp)*

Guest Lecturer in UVA Biomedical Engineering Graduate Course, 2/20/2014  
*Introduction to Bioinformatics*

Guest lecture, UNC-Charlotte Bioinformatics Program, 11/15/2013  
*Bioinformatics-as-a-Service: Applications, Opportunities, and Challenges with Large-Scale -Omics Data*

Invited speaker and panelist at UVA School of Medicine Research Data Fair. 10/18/2013.  
*BioConnector: A multi-faceted approach connecting researchers to the resources and services they need*

Invited *Thought Leader* at UVA Center for Public Health Genomics Retreat, 4/27/2013.  
*Computational / Analytical Genomics: Spanning the Gap from Data to Knowledge*

Instructor at University of Miami's Genetic Analysis of Complex Human Diseases Course, 5/22/2013.  
*Examining Gene Expression and Methylation with Next-Gen Sequencing*

Lecture & Lab in Essentials of Translational Science (UVA Cell Biology 8401), 4/2013.  
*Introduction to Bioinformatics (Lecture), Gene Expression Analysis with Bioconductor (Lab)*

Organizer, Software Carpentry Two-Day Software Skills Bootcamp. 3/2013.  
*Software Carpentry Two-Day Software Skills Bootcamp*

Lecturer in UVA PHS 7070: Introduction to Health Informatics Graduate Course, 11/2012.  
*Introduction to Bioinformatics*

Panel Discussion, 20<sup>th</sup> Annual Conference on Intelligent Systems for Molecular Biology (ISMB), Long Beach, CA, 7/16/2012.  
*Bioinformatics Core Facilities Workshop on Data Integration*

Instructor at University of Miami's Genetic Analysis of Complex Human Diseases Course, 5/24/2012  
*Examining Gene Expression and Methylation with Next-Gen Sequencing.*

Panelist at UVA Library Scientific Data Consulting Group's Data Management Day, 4/12/2012  
*Panel Discussion on Data Management Training and Support at UVA*

UVA Health Sciences Library Special Topics Seminar, 4/10/2012  
*Introduction to Bioinformatics and the UVA Bioinformatics Core*

Guest Lecturer in UVA Pharmacology 9020 Graduate Course, 4/2/2012  
*Bioinformatics at Virginia: Opportunities and Challenges with Large-Scale -Omics Data*

Guest Lecturer in UVA Biomedical Engineering Graduate Course, 1/25/2012  
*Bioinformatics at Virginia: Opportunities and Challenges with Large-Scale -Omics Data.*

## TALKS

Invited talk/panelist, UVA Conference on National Defense and Intelligence, 6/13-14/2016  
*Value: The Fifth V of Big Data*

Invited talk, Case Western Reserve University, 3/23/2016  
*Bioinformatics as a Service: The Evolving Role of the Bioinformatics Core in Contemporary Biomedical Research*

Invited talk, Penn State University, 12/9/2015  
*Bioinformatics as a service*

Invited talk, Association of Biomolecular Resource Facilities (ABRF) Mid-Atlantic Directors and Staff of Cores (MADSSCi) meeting, Charlottesville VA, 6/4/2015.  
*RNA-seq data analysis and deliverables from your bioinformatics core.*

Invited talk, Center for Open Science, 7/22/2014.  
*Enabling Reproducible Bioinformatics Research with Service and Training.*

Invited talk, Biology Department Seminar Series, James Madison University, 10/11/2013.  
*Bioinformatics-as-a-Service.*

Invited Talk & Association of Biomolecular Resource Facilities (ABRF) first annual Mid-Atlantic Directors and Staff of Cores (MADSSCi) meeting, Frederick MD, 6/22/2013.  
*Bioinformatics Cores & New Technologies: The evolving role of 21st Century Bioinformatics Core Facilities.*

Invited Speaker and Panelist at UVA Center for Public Health Genomics Retreat, 4/27/2013.  
*Computational / Analytical Genomics: Spanning the Gap from Data to Knowledge*

Invited Talk, School of Engineering, Science and Technology, Virginia State University, 2/22/2013.  
*Bioinformatics-as-a-Service.*

Invited Talk, Department of Statistics Colloquium, University of Virginia, 10/19/2012.  
*Bioinformatics-as-a-Service.*

Invited Talk, Center for Human Genetics Research, Vanderbilt University, 9/21/2012.  
*Bioinformatics-as-a-Service.*

Invited Talk, 20<sup>th</sup> Annual Conference on Intelligent Systems for Molecular Biology, Long Beach, CA, 7/16/2012.  
*From Data to Knowledge: Extracting Biological Insight from Diverse Data Sources.*

Invited Talk, Genome Sciences Seminar Series, University of Virginia, 4/23/12.  
*Bioinformatics at Virginia: Opportunities and Challenges with Large-Scale –Omics Data.*

Invited Talk, Pacific Symposium in Biocomputing, Big Island, Hawaii, 1/5/2011.  
*A Multivariate Analysis of Regulatory SNPs: Empowering Personal Genomics by Considering Cis-Epistasis and Heterogeneity.*

Platform Presentation, 60<sup>th</sup> Annual American Society of Human Genetics Meeting, Washington, DC 10/5/2010.  
*Knowledge-driven multi-locus analysis reveals gene-gene interactions influencing HDL cholesterol level in two independent biobanks.*

Invited Talk, 8th European Conference on Evolutionary Computation, Machine Learning and Data Mining in Bioinformatics, Istanbul, Turkey, 4/7/2010.  
*Grammatical Evolution of Neural Networks for Discovering Epistasis among Quantitative Trait Loci.*

Graduate Student Research Symposium, Vanderbilt University, 3/26/2010.  
*Using a biobank linked to an electronic medical record to study genetic underpinnings of complex disease.*

Genetics Interest Group, Vanderbilt University, 3/11/2010.  
*Using GWAS in an EMR-linked biobank to explore genetic and environmental determinants of HDL cholesterol.*

Invited Talk, 7th European Conference on Evolutionary Computation, Machine Learning and Data Mining in Bioinformatics, University of Tübingen, Germany, 4/15/2009.



*Conquering the Needle-in-a-Haystack: How Correlated Input Variables Beneficially Alter the Fitness Landscape for Neural Networks.*

Genetics Interest Group, Vanderbilt University, 2/26/2009.

*Conquering the Needle-in-a-Haystack: How Correlated Input Variables Beneficially Alter the Fitness Landscape for Neural Networks.*

Genetics Interest Group, Vanderbilt University, 4/1/2008.

*Neural Networks for Disease Gene Identification.*

## **SERVICE**

### **Peer Review**

2014-2017	Referee for <i>Bioinformatics</i>
2015-2016	Referee for <i>Nature Methods</i>
2015	Referee for O'Reilly book: <i>Bioinformatics Data Skills</i>
2013	Referee for <i>BMC Genetics</i>
2013	Referee for <i>G3: Genes, Genomes, Genetics</i>
2011	Referee for Elsevier book: <i>R and Data Mining: Examples and Case Studies</i>
2011	Referee for <i>Bioinformatics</i>
2011	Referee for <i>American Journal of Epidemiology</i>
2011	Referee for <i>BioData Mining</i>
2010	Referee for <i>Respiratory Research</i>

### **National / International Service**

2017-	Association of Biomolecular Resource Facilities Genomics Bioinformatics Research Group
2016-2017	International Review Committee for Genome Canada <i>Genome Technology Platforms</i>
2016-2017	External Review: Lawrence Livermore National Laboratory (LLNL) Institutional Computing Grand Challenge program
2016	Expert panelist on U.S. Government Accountability Office (GAO) panel on Gaps in Capabilities for Attributing the Source of a Biological Attack, hosted by the National Academies of Sciences, Engineering, and Medicine.
2016	International Review Committee for Genome Canada <i>Disruptive Innovation in Genomics</i>
2015	International Review Committee for Genome Canada <i>Technology Development Fund</i>
2013-2014	External Review: Vanderbilt Center for Quantitative Sciences Grant Program
2012-2013	International College of Reviewers for Genome Canada and Canadian Institutes of Health Research Genomics and Personalized Health
2011-2013	Program committee: European Conference on Evolutionary Computation, Machine Learning and Data Mining in Computational Biology

### **Regional / Local Service**

2017-	Association of Biomolecular Resource Facilities Genomics Bioinformatics Research Group
2017-	Steering Committee: UVA Trans-University Microbiome Initiative
2017	Search committee for UVA Health Sciences Library Research Data Specialist
2016	Search committee for UVA Health Sciences Library Clinical Data Specialist
2015-2016	Search committee for UVA Child Health Research Center, Department of Pediatrics Computational Biology
2015	Search Committee, UVA CIO Office Director of Research Computing Infrastructure
2013	Session Organizer, Association of Biomolecular Resource Facilities (ABRF) First annual Mid-Atlantic Directors and Staff of Cores (MADSSCi) meeting.

## POSTERS & ABSTRACTS

ASM Conference on Rapid Applied Microbial NGS and Bioinformatic Pipelines. Oct 2017, Washington DC.  
*SEQ\_ID: A bioinformatics pipeline for taxonomic label verification of WGS data.*  
Libuit KG, **Turner SD**, Nassiri A, Turner L.

ASM Conference on Rapid Applied Microbial NGS and Bioinformatic Pipelines. Oct 2017, Washington DC.  
*Dahak: A sustainable approach to high confidence metagenomics analysis of complex samples.*  
Brooks P, ..., **Turner SD**, Brown CT.

50th Annual Meeting of the Society for the Study of Reproduction. July 2017, Washington DC.  
*MicroRNA Expression and Sex Differences in the Human First Trimester Placenta.*  
Gonzalez TL, Lee B, Sun T, Koeppel AF, **Turner SD**, Farber CR, Rich SS, Williams J, Pisarska MD.

AACR Annual Meeting 2017; April 1-5, 2017; Washington, DC  
*Overcoming MET inhibitor resistance in GBM therapy.*  
Cruickshanks NA, ..., **Turner SD**, ..., Abounader R.

Society for Reproductive Investigation 64th Annual Scientific Meeting. March 2017, Orlando, FL.  
*First Trimester Placenta Transcriptome and Variation Among the Sexes*  
Gonzalez TL, Koppel AF, Lee B, Sun T, Wang E, Kroener L, Farber CR, Rich SS, Chen I, Rotter JI, **Turner SD**, Williams J, Pisarska MD.

Society of Toxicology annual meeting, Baltimore MD, March 2017.  
*Time Study of Gene Expression in Mouse Muscle after Nickel Pellet Implantation.*  
Bannon DI, Bao W, Turner SD, Perkins E, Abounader R.

American Society for Microbiology National Meeting 2016.  
*Assessing the Incidence of Plasmid-borne Resistance to Clinically-Significant Antibiotics in Stream Sediments.*  
Libuit KG, Kapsak C, Gehr EF, Pelin A, **Turner SD**, Herrick JB.

Oxford Nanopore MinION Community Meeting, 2015  
*MinION Sequencing to Reveal Genes Encoding Resistance to Late-Generation Human Clinical Antibiotics Found on Plasmids Isolated from Stream Sediment*  
Libuit K, Kapsak C, **Turner SD**, Herrick JB.

American Society for Microbiology joint Interscience Conference of Antimicrobial Agents and Chemotherapy (ICAAC) + International Society of Chemotherapy (ISC) International Congress of Chemotherapy and Infection (ICC) meeting, ICAAC/ICC 2015  
*Nanopore Sequencing of Transmissible Tetracycline Plasmids Captured without Cultivation from Stream Sediment Reveals Linked Genes Encoding Resistance to Multiple Human Clinical Antibiotics*  
Gehr EF, Libuit KG, Kapsak CJ, **Turner SD**, Herrick JB.

Union World Conference on Lung Health, 12/2/2015  
*An amplicon-based next generation sequencing platform for the Illumina MiSeq for 10 genes involved in first and second-line drug resistance*  
Darwin JO, Koeppel AF, **Turner SD**, Pholwat S, Kibiki GS, Ogarkov O, Foongladda S, Banu S, Keysell SK, Houpt ER.

American Society for Microbiology, Virginia Branch Meeting, 11/7/2014  
*Testing the MinION a New Nanopore-Based Third-Generation DNA Sequencer for Salamander Skin Metagenomics*  
Kapsak C, Libuit K, Herrick JB, **Turner SD**.

American Society of Human Genetics Meeting, 10/22/2014.

*RNA-seq analysis reveals potential link between mammalian mtFAS II, RNA processing, and neurodegeneration.*

Mitchell S, Parl A, **Turner SD**, Crawford DC, Murdock DG.

American Society of Human Genetics Meeting, 10/22/2014.

*Genome-wide DNA methylation analyses identify loci influencing recurrent stroke risk in samples from the Vitamin Intervention for Stroke Prevention clinical trial.*

Keene KL, Chen W, **Turner SD**, Koeppel AF, Williams SR, Sale MM, Worrall BB.

18th International Congress of Parkinson's Disease and Movement Disorders, 6/8/2014.

*Investigation of Genetic Variants Associated with Alzheimer Disease and Vascular Dementia in Parkinson Disease cognition.*

Barrett MJ, Koeppel AF, Flanigan J, Turner SD, Worrall BB.

2014 American Society for Microbiology Biodefense and Emerging Diseases meeting, 01/28/2014.

*Microbial Threat Characterization Pipeline.*

Torres M, Torres C, Wagner M, **Turner SD**, Minot S, Ternus K, Slezak S.

2013 Cold Spring Harbor Meeting on Genome Informatics, 11/1/2013.

*Evaluating novel metagenomic classification algorithms for forensic microbial detection.*

Minot S, Ternus K, **Turner SD**, Allen J, Budowle B, Kadavy D.

Mid-Atlantic Chapter of the Medical Library Association Regional Meeting 2012. (Paper & talk presented by BR).

*The BioConnector - Research Informatics Support Through Collaboration.*

Ragon B, Arnold G, Horne AS, Harrison J, **Turner SD**.

Fourth Congress of the International Biolron Society, 5/25/2011.

*Transferrin Gene Polymorphism rs3811647 and Iron Status in Patients with Iron Deficiency and Control Subjects.*

McLaren GD, McCarty CA, Ritchie MD, **Turner SD**, Gordeuk VR, Garner CP, Vulpe CD, McLachlan S, Adams PC, McLaren CE.

American Society of Hematology Meeting, 12/4/2010 (*Blood* Vol 116, No 21, p 172).

*Lack of Association between Single Nucleotide Polymorphism rs3811647 in the TF Gene and Iron Status in Patients with Iron Deficiency and Control Subjects.*

McLaren GD, McCarty CA, Ritchie MD, **Turner SD**, Gordeuk VR, Garner CP, Vulpe CD, McLachlan S, Adams PC, McLaren CE.

American Society of Human Genetics Meeting, 11/5/2010 (Platform presentation).

*Gene-gene interactions associated with Alzheimer disease replicate in independent Alzheimer Disease Genetics Consortium datasets.*

Thornton-Wells TA, Torstenson ES, **Turner SD**, Dudek SM, Bush WS, Ritchie MD, Martin E, Pericak-Vance MA, Haines, JL.

American Society of Human Genetics Meeting, 11/5/2010.

*Quality Control Pipeline for Genome-Wide Association Studies in the eMERGE Network: Comparing Single Site QC to a Merged QC Approach.*

Ritchie MD, Armstrong L, Bradford Y, Carlson C, Crawford DC, Crenshaw AT, de Andrade M, Doheny K, Haines JL, Hayes G, Jarvik G, Jiang L, Ling H, Kullo I, Li R, Manolio TA, Matsumoto M, McCarty CA, McDavid A, Mirel D, Paschall J, Pugh E, Rasmussen LV, Wilke RA, Zuvich RL, **Turner, SD**.

American Society of Human Genetics Meeting, 11/4/2010.

*Initialization Parameter Sweep in ATHENA: Optimizing Neural Networks for Detecting Gene-Gene Interactions in Simple and Complex Disease Models.*

Holzinger ER, Buchanan C, **Turner SD**, Torstenson ES, Dudek SM, Ritchie MD.

11<sup>th</sup> Annual Vanderbilt Human Genetics Symposium 10/08/2009.

*Knowledge-driven multi-locus analysis reveals gene-gene interactions influencing HDL cholesterol level in two independent biobanks.*

**Turner SD**, Bert RL, Crawford DC, Denny JC, Linneman JG, McCarty CA, Peissig PL, Rasmussen LV, Roden DM, Wilke RA, Ritchie MD.

International Genetic Epidemiology Society Meeting, 10/11/2010.

*Quality Control Pipeline for Genome-Wide Association Studies in the eMERGE Network: Comparing Single Site QC to a Merged QC Approach.*

Ritchie MD, Armstrong L, Bradford Y, Carlson C, Crawford DC, Crenshaw AT, de Andrade M, Doheny K, Haines JL, Hayes G, Jarvik G, Jiang L, Ling H, Kullo I, Li R, Manolio TA, Matsumoto M, McCarty CA, McDavid A, Mirel D, Paschall J, Pugh E, Rasmussen LV, Wilke RA, Zuvich RL, **Turner, SD**.

International Genetic Epidemiology Society Meeting, 10/11/2010.

*Knowledge-driven multi-locus analysis reveals gene-gene interactions influencing HDL cholesterol level in two independent biobanks.*

**Turner SD**, Bert RL, Crawford DC, Denny JC, Linneman JG, McCarty CA, Peissig PL, Rasmussen LV, Roden DM, Wilke RA, Ritchie MD.

11th International Conference on Parallel Problem Solving From Nature, Krakow, Poland, 9/11/2010.

*Incorporating Domain Knowledge into Evolutionary Computing for Discovering Gene-Gene Interaction.*

**Turner SD**, Dudek SM, Ritchie MD.

American Medical Informatics Association Summit on Translational Bioinformatics, 3/11/2010.

*Using Self-Reported Data to Determine Relatedness in Biobank Subjects.*

Rasmussen L, **Turner SD**, Waudby C, Ritchie MD, McCarty CA.

Pacific Symposium in Biocomputing, 1/7/2010.

*Evaluating and Improving Grammatical Evolution Neural Networks for Discovering Epistasis Influencing Quantitative Traits.*

**Turner SD**, Dudek SM, Ritchie MD.

American Society of Human Genetics Meeting, 10/22/2009.

*Genome-wide association study of cataract in the Marshfield Personalized Medicine Research Project as part of the eMERGE network.*

Torstenson ES, McCarty CA, **Turner SD**, Bradford Y, Berg R. Peissig P, Linneman J, Starren J, Waudby C, Chen L, Ritchie MD.

American Society of Human Genetics Meeting, 10/22/2009.

*Genome-wide association study on HDL cholesterol level in the Marshfield Personalized Medicine Research Project as part of the eMERGE network.*

**Turner SD**, McCarty CA, Bradford Y, Berg R. Peissig P, Linneman J, Starren J, Wilke RA, Ritchie MD.

American Society of Human Genetics Meeting, 10/22/2009.

*Getting Genetics Done: an educational productivity blog by graduate students for getting things done in human genetics research.*

Holzinger ER, Bush WS, **Turner SD**.

International Genetic Epidemiology Society Meeting, 10/19/2009.

*Genome-wide association study on HDL cholesterol level in the Marshfield Personalized Medicine Research Project as part of the eMERGE network.*

**Turner SD**, McCarty CA, Bradford Y, Berg R. Peissig P, Linneman J, Starren J, Wilke RA, Ritchie MD.

10<sup>th</sup> Annual Vanderbilt Human Genetics Symposium 10/08/2009.

*Genome-wide association study on HDL cholesterol level in the Marshfield Personalized Medicine Research Project as part of the eMERGE network.*

**Turner SD**, McCarty CA, Bradford Y, Berg R, Peissig P, Linneman J, Starren J, Wilke RA, Ritchie MD.

American Society of Human Genetics Meeting, 11/12/2008.

*Genome-wide Analysis of Gene-Gene Interaction in Alzheimer Disease.*

**Turner SD**, Martin ER, Beecham GW, Gilbert JR, Haines JL, Pericak-Vance MA, Ritchie MD.

American Heart Association Scientific Sessions, 11/10/2008.

*SCN5A Promoter and Enhancer Variants associated with Atrial Fibrillation.*

Watanabe H, Darbar D, Attack TC, Yang P, Ritchie MD, **Turner SD**, Ingram CR, Roden DM.

International Genetic Epidemiology Society Meeting 9/14/2008.

*Genome-wide Analysis of Gene-Gene Interaction in Alzheimer Disease.*

**Turner SD**, Martin ER, Beecham GW, Gilbert JR, Haines JL, Pericak-Vance MA, Ritchie MD.

9<sup>th</sup> Annual Vanderbilt Human Genetics Symposium 09/11/2008.

*Genome-wide Analysis of Gene-Gene Interaction in Alzheimer Disease.*

**Turner SD**, Martin ER, Beecham GW, Gilbert JR, Haines JL, Pericak-Vance MA, Ritchie MD.

International Conference on Alzheimer's Disease, 7/26/2008.

*Genome-wide Analysis of Gene-Gene Interaction in Alzheimer Disease.*

Martin ER, **Turner SD**, Beecham GW, Gilbert JR, Haines JL, Pericak-Vance MA, Ritchie MD.

Program in Human Genetics Annual Retreat, 4/9/2008.

*Neural Networks for Disease Gene Discovery.*

**Turner SD.**

American Society of Human Genetics Meeting, 10/23/2007.

*GenomeSIMLA: A Data Simulation Package to Explore the Human Genome.*

Edwards TL, Bush WS, **Turner SD**, Torstenson ES, Dudek SM, Ritchie MD.

American Society of Human Genetics Meeting, 10/23/2007.

*A Platform for the Analysis, Translation, and Organization of Whole-Genome Association Data.*

Ritchie MD, **Turner SD**, Bush WS, Dudek SM.

American Society of Human Genetics Meeting, 10/23/2007.

*Examination of Sortilin-related receptor SORL1 in late onset Alzheimer Disease.*

**Turner SD**, Liang X, Martin ER, Schnetz-Boutaud N, Bartlett J, Anderson BM, Zuchner S, Gwirtsman H, Schmechel D, Carney R, Gilbert J, Pericak-Vance MA, Haines JL.

8<sup>th</sup> Annual Vanderbilt Human Genetics Symposium 09/06/2007.

*Development of a sequential replication filter to minimize type I error in genetic association studies.*

**Turner SD**, Dudek SM, Ritchie MD.

## **ADVANCED COURSEWORK AND EDUCATION**

Teaching Software Carpentry, January 2014

Description: This course teaches scientists how to teach other scientists how to program. In it, we cover the basics of educational psychology and instructional design, and look at how to use these ideas in both intensive workshops and regular classes.

American Society for Training & Development Training Certificate, Alexandria VA, 2014

Description: This three-day workshop is a practical, how-to overview of the entire training function. It prepares new trainers with critical training skills and introduces seasoned practitioners to the latest techniques for delivering powerful training. This includes being introduced to the ASTD Competency Study, which forms the foundation of the ASTD Training Certificate.

Software Carpentry Bootcamp\*, University of Virginia, 2013

*\*I invited the instructors and organized this course to be given at University of Virginia*

Description: Software Carpentry helps researchers be more productive by teaching them basic computing skills. We run boot camps at dozens of sites around the world, and also provide open access material online for self-paced instruction. Our boot camps cover the core skills every scientist needs to get more done in less time: program construction, version control, testing, the command line, and data management. Short lessons alternate with hands-on practical sessions for two full days.

Browsing Genes and Genomes with Ensembl.\*, University of Virginia, 2012

*\*I invited the instructor and organized this course to be given at University of Virginia*

Description: The Ensembl project (<http://www.ensembl.org>) provides a comprehensive and integrated source of annotation of, mainly vertebrate, genome sequences. This 1-day workshop offers participants the possibility of gaining lots of hands-on experience in the use of the Ensembl genome browser but also provides them with the necessary background information. The workshop consists of several modules with presentations, demonstrations, and ample opportunity to do exercises. Modules include: introduction to Ensembl, data retrieval with BioMart, comparative genomics, variation, regulation, and custom annotation.

Looking at Data by Hadley Wickham\*, Vanderbilt University, 2010

*\*I invited the instructor and organized this course to be given at Vanderbilt University*

Description: This short course in data visualization will teach you how to explore your data using statistical graphics. You will learn how to use exploratory data analysis to find unexpected features in data and build better models by iterating between fitting and plotting. The course will focus on ggplot2, a new data visualization package for R that uses a graphical grammar to create a powerful and flexible system for creating beautiful data graphics. In addition to an introduction to ggplot2, the course will also cover topics related to graphics for large datasets, data manipulation & transformation, and how to polish graphics for maximum presentation impact.

Regression Modeling Strategies Short Course by Frank Harrell, Vanderbilt University, 2010

Description: This short course is aimed at statistical practitioners, educators, and students of statistics throughout science and engineering who wish to have an overview of all the steps involved in the proper conduct of regression modeling, using modern methods and procedures. The speaker is nationally known, and is Chair of the Department of Biostatistics at the Vanderbilt University School of Medicine. He has also published a textbook by the same title as this course.

Grant & Fellowship Workshop for Graduate Students, Vanderbilt University, 2010

Description: These concurrent sessions will address grant proposal writing from inception to completion. In this workshop, Vanderbilt University's active grant recipients will discuss conceptualizing the project, composing convincing budgets, and securing necessary approval.

An Introduction to the Fundamentals & Functionality of the R Language, Vanderbilt University, 2009

Description: In this 1-day course, we will introduce R, the free interactive programming language and environment for statistical computing and graphics. We will emphasize the fundamentals and functionality of the language. During this course, we will cover some of the fundamentals, but will also get right into the functionality - we will cover loading data, data manipulation, summarizing data with descriptive statistics, and graphical representation of data with R's plotting features. The goal is that you will be very comfortable interacting with R and will have enough knowledge to start using and learning R on your own.

Presenting Data and Information by Edward Tufte, Durham NC, 2009

Description: This one-day course taught by Edward Tufte covers fundamental strategies of analytical design, evaluating evidence used in presentations, credibility of presentations, and strategic graphic design of statistical data, and effective delivery of business, scientific, research, and financial presentations.

Genetic Analysis of Complex Human Diseases\*, University of Miami, 2008, 2012-2013.

*\*I took this course as a student in 2008, and taught as an instructor in 2012 and 2013.*

Description: A comprehensive four-day course directed toward physician-scientists and other medical researchers. The course will introduce state-of-the-art approaches for the mapping and characterization of human inherited disorders with an emphasis on the mapping of genes involved in common and genetically complex disease phenotypes.

Pharmacogenomics Research Network Analysis Workshop VI, St. Jude Children's Research Hospital, 2008

Description: This is a small group, highly-interactive meeting with short oral presentations and extensive discussion. The purpose is to share state-of-the-art techniques and ideas for analysis of pharmacogenetic/genomic data.

Summer Institute in Statistical Genetics: Computing for Statistical Genetics, University of Washington, 2007

Description: This course introduces software for analysis of genetic data in the R statistical environment. Data management in R, programming concepts for R, and standard regression analyses will be discussed. These topics will be followed by analysis more specific to genetic data, including association analysis, and haplotype inference. Use of the extensive collection of genomics packages from the Bioconductor project will be introduced. Finally, the use of R as an interface to other more specialized "legacy" software will be demonstrated. Reference will be made to current analyses of whole-genome association study data.

Responsible Conduct in Research Course, Vanderbilt University, 2006

Description: This program is designed to help scientists identify and deal with ethical issues and dilemmas, and to promote open discussion of such topics as: institutional and NIH policies regarding scientific misconduct and conflicts of interest, ethical considerations of research involving human and animal subjects, responsible authorship and review of scientific publications and grants, data management, record keeping, and IP.

## COMPUTING AND SOFTWARE EXPERTISE

Bioinformatics:	R, BEDTools, GATK, IGV, Annovar, BLAST, Galaxy, BWA/Bowtie, Tophat, Cufflinks, edgeR, DESeq, DEXSeq, limma, Samtools, Picard, Krona, VCFTools, ...
Programming:	R, Bash, Perl, Python, MATLAB
Statistical computing:	R, R/Bioconductor, Stata, SAS, SPSS, JMP
Genetic analysis:	R, PLINK, VCFtools, Eigensoft, Haploview, GATK
Other:	SQL, Linux/Unix