Darren A. Cusanovich

Curriculum Vitae

University of Arizona
Asthma & Airway Disease Research Center
Bioscience Research Lab, Room 421
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Tucson, AZ 85721

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Current Positions

The University of Arizona
Research Assistant Professor, Cellular and Molecular Medicine
Assistant Research Scientist, Asthma & Airway Disease Research Center

Education

The University of Chicago, Chicago, IL
Ph.D. Human Genetics 2008 – 2013
Advisor: Yoav Gilad
Thesis: "Integrative genomics approaches to understanding the role of gene regulation in human evolution, disease, and cellular networks: a triptych"

The University of Arizona, Tucson, AZ
Continuing education 2006 – 2008

Loyola University New Orleans, New Orleans, LA
B.S. Music Business 1999 – 2002
Minor in Business Administration
Graduated *Magna Cum Laude*
Dean's Scholar

Professional Experience

The University of Arizona
Research Assistant Professor, Cellular and Molecular Medicine 2018 – Present
Assistant Research Scientist, Asthma & Airway Disease Research Center

The University of Washington
Senior Postdoctoral Fellow 2014 – 2018
Principal Investigator: Jay Shendure

Developing single-cell genomic technologies to better understand eukaryotic gene regulation. Applying these technologies to understand the variation in gene regulation in complex systems.

CancerIQ
Team Member 2013
Participated in The University of Chicago Booth School of Business New Venture Challenge with three teammates

- Competition finalists (4th place)
- Advised MBA teammates scientifically
- Co-wrote business plan
- Helped to develop business pitch
- Managed development of user interface and product licensing agreements

Arizona Respiratory Center at The University of Arizona
Laboratory Assistant 2006 – 2008
Principal Investigator: Donata Vercelli

- Project 1: Studied functional evolution of *IL13* promoter in humans and related primates
- Project 2: Studied genome-wide methylation patterns in response to early-life environmental (indoor dog) exposures

The University of Chicago
Summer Intern 2007
Principal Investigator: Carole Ober

- Project 1: Evaluated potential role of *OR12D2* in asthma susceptibility
- Project 2: Studied eQTLs influencing Lp(a) plasma levels
- Trained and supervised undergraduate student who won award for report on *OR12D2* study

American Society of Composers, Authors and Publishers
Executive Assistant 2002-2006

- Worked in Film & Television Music Department
- Assisted songwriters, composers and music publishers in joining society and collecting performance royalties
- Coordinated annual Film & Television Music Awards Show
- Coordinated annual Film Composers' Workshop
- Assistant to 3 executives

Teaching Experience

The University of Chicago

Teaching Assistant, Genetic Analysis of Model Organisms	2009
Teaching Assistant, Genomics and Systems Biology	2010
Teaching Assistant, Human Genetics One	2010

Honors

2016 – 2018	The University of Washington NIH Cardiovascular Training Grant Recipient
2016	ASHG/Charles J. Epstein Trainee Award for Excellence in Human Genetics Research – Semifinalist
2013	The University of Chicago Booth School of Business New Venture Challenge Finalist (4th Place)
2008 – 2010	The University of Chicago NIH Genetics and Regulation Training Grant Recipient
2002	Loyola University, New Orleans – Graduated *Magna Cum Laude*
1999 – 2002	Loyola University, New Orleans – Dean's Scholar

Publications and Submitted Manuscripts

Cusanovich DA*, Hill AJ*, Aghamirzaie D, Daza RM, Pliner HA, Berletch JB, Filippova GN, Huang X, Christiansen L, DeWitt WS, Lee C, Regalado SG, Read DF, Steemers FJ, Disteche CM, Trapnell C, Shendure J. A Single-Cell Atlas of In Vivo Mammalian Chromatin Accessibility. *Cell* (Online Now). 2018 Aug 2; doi: https://doi.org/10.1016/j.cell.2018.06.052.
* = co-first author

Pliner HA, Packer J, McFaline-Figueroa JL, **Cusanovich DA**, Daza R, Aghamirzaie D , Srivatsan S, Qiu X, Jackson D, Minkina A, Adey AC, Steemers FJ, Shendure J, Trapnell C. Cicero Predicts cis-Regulatory DNA Interactions from Single-Cell Chromatin Accessibility Data. *Molecular Cell* (Online Now). 2018 Aug 2; doi: https://doi.org/10.1016/j.molcel.2018.06.044.

Cusanovich DA*, Reddington JP*, Garfield DA*, Daza R, Aghamirzaie D, Marco-Ferreres R, Pliner H, Christiansen L, Qiu X, Steemers F, Trapnell C, Shendure J, Furlong EEM. The cis-regulatory dynamics of embryonic development at single cell resolution. *Nature*. 2018 Mar 22; 555(7697):538-542.
* = co-first author

Cao J, Packer JS, Ramani V, **Cusanovich DA**, Huynh C, Daza R, Qiu X, Lee C, Furlan SN, Steemers FJ, Adey A, Waterston RH, Trapnell C, Shendure J. Comprehensive single-cell transcriptional profiling of a multicellular organism by combinatorial indexing. *Science*. 2017 Aug; 357(6352):661-667.

Gasperini M, Findlay GM, McKenna A, Milbank JH, Lee C, Zhang MD, **Cusanovich DA**, Shendure J. CRISPR/Cas9-Mediated Scanning for Regulatory Elements Required for HPRT1 Expression via Thousands of Large, Programmed Genomic Deletions. *American Journal of Human Genetics*. 2017 Aug; 101(2):192-205.

Ramani V, **Cusanovich DA**, Hause RJ, Ma W, Deng X, Blau CA, Disteche CM, Noble WS, Shendure J, Duan Z. Mapping 3D genome architecture through *in situ* DNase Hi-C. *Nature Protocols*. 2016 Nov; 11(11):2104-2121.

Cusanovich DA, Caliskan M, Billstrand C, Michelini KJ, Chavarria C, De Leon S, Mitrano A, Lewellyn N, Elias JA, Chupp GL, Lang RM, Shah SJ, DeCara JM, Gilad Y, Ober C. Integrated Analyses of Gene Expression and Genetic Association Studies in a Founder Population. *Human Molecular Genetics*. 2016 Feb 29; 25(10): 2104-2112.

Davenport ER, **Cusanovich DA**, Michelini K, Barreiro LB, Ober C, Gilad Y. Genome-Wide Association Studies of the Human Gut Microbiota. *PLoS One*. 2015 Nov 3; 10(11): e0140301.

Cusanovich DA, Daza R, Adey A, Pliner HA, Christiansen L, Gunderson KL, Steemers FJ, Trapnell C, Shendure J. Multiplex single-cell profiling of chromatin accessibility by combinatorial cellular indexing. *Science*. 2015 May 22; 348(6237): 910-914.

Cusanovich DA, Pavlovic B, Pritchard JK, Gilad, Y. The functional consequences of variation in transcription factor binding. *PLoS Genetics*. 2014 Mar 6; 10(3):e1004226.

Khan Z, Ford MJ, **Cusanovich DA**, Mitrano A, Pritchard JK, Gilad Y. Transcript and protein expression levels evolve under compensatory selection pressures in primates. *Science.* 2013 Nov 29; 342(6162):1100-1104.

Iskow RC, Gokcumen O, Abyzov A, Malukiewicz J, Zhu Q, Sukumar AT, Pai AA, Mills RE, Habegger L, **Cusanovich DA**, Rubel MA, Perry GH, Gerstein M, Stone AC, Gilad Y, Lee C. Regulatory element copy number differences shape primate expression profiles. *Proceedings of the National Academy of Sciences*. 2012 Jul 31; 109(31):12656-12661.

Cusanovich DA, Billstrand C, Zhou X, Chavarria C, De Leon S, Michelini K, Pai AA, Ober C, Gilad Y. The combination of a genome-wide association study of lymphocyte count and analysis of gene expression data reveals novel asthma candidate genes. *Human Molecular Genetics*. 2012 May 1; 21(9):2111-2123.

Caliskan M, **Cusanovich DA**, Ober C, Gilad Y. The effects of EBV transformation on gene expression levels and methylation profiles. *Human Molecular Genetics*. 2011 Apr 15; 20(8):1643-1652.

Ober C, Nord AS, Thompson EE, Pan L, Tan Z, **Cusanovich D**, Sun Y, Nicolae R, Edelstein C, Schneider DH, Billstrand C, Pfaffinger D, Phillips N, Anderson RL, Philips B, Rajagopalan R,

Hatsukami TS, Rieder MJ, Heagerty PJ, Nickerson DA, Abney M, Marcovina S, Jarvik GP, Scanu AM, Nicolae DL. Genome-wide association study of plasma lipoprotein(a) levels identifies multiple genes on chromosome 6q. *Journal of Lipid Research*. 2009 May; 50(5):798-806.

Research Presentations

Cusanovich DA. Chromatin accessibility of complex systems resolved by single-cell ATAC-seq. Invited Speaker. European Molecular Biology Laboratory. 2017.

Cusanovich DA. Chromatin dynamics across tissues and development are revealed by highly multiplexed single cell ATAC-seq. Invited Speaker. Fred Hutchison Cancer Research Center. 2017.

Cusanovich DA, Daza R, Berletch JB, Filippova GN, Christiansen L, Steemers FJ Disteche CM, Trapnell C, Shendure J. Towards a mammalian atlas of *in vivo* epigenetic state at single cell resolution. Platform Presentation. American Society of Human Genetics, Vancouver. 2016.

Cusanovich DA. Chromatin Accessibility in Development & Disease. Invited Speaker. Colloquium: Problems in the Biology of Complex Diseases. University of Arizona. 2016.

Cusanovich DA, Multiplex Single-Cell Profiling of Chromatin Accessibility by Combinatorial Cellular Indexing. Invited Speaker. Seattle Illumina User Group Meeting. 2015.

Cusanovich DA, Daza R, Adey A, Pliner H, Christiansen L, Lee C, Morse M, Berletch J, Disteche C, Gunderson KL, Steemers FJ, Trapnell C, Shendure J. Massively parallel single cell profiling of chromatin accessibility by combinatorial indexing. Poster Presentation. Biology of Genomes. Cold Spring Harbor. 2015.

Cusanovich DA, Shendure J. The Chromatin Architecture of a Haploid Human Cell Line. Poster Presentation. American Society of Human Genetics, San Diego. 2014.

Cusanovich DA, Pavlovic B, Pritchard JK**,** Gilad Y. Effect of Transcription Factor Binding Variation Depends on Genomic Context. Poster Presentation. American Society of Human Genetics. Boston. 2013.

Cusanovich DA, Billstrand C, Chavarria C, Michelini K, Pai AA, Ober C, Gilad Y. Combining gene expression and genome-wide association data to identify novel asthma susceptibility genes. Talk. University of Chicago Biological Sciences Division Graduate Student Retreat. 2012.

Cusanovich DA, Billstrand C, Chavarria C, Michelini K, Pai AA, Ober C, Gilad Y. Integrating gene expression data with genome-wide association studies to identify novel asthma susceptibility candidate genes. Poster Presentation. International Congress of Human Genetics, Montreal, Quebec. 2011.