Pratyaydipta Rudra

CONTACT INFORMATION

Address:
Department of Statistics
301D MSCS
Stillwater, OK 74078, U.S.A.
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EDUCATION

Ph.D., Biostatistics August 2010 - August 2015
The University of North Carolina, Chapel Hill, NC.
Advisor: Fred A. Wright, Professor & Andrew Nobel, Professor.
Title: Statistical tools for general association testing and control of false discoveries in group testing.

Master of Statistics August 2008 - May 2010
(Specialization: Applied Statistics)
Indian Statistical Institute, Kolkata, India.

Bachelor of Statistics, August 2005 - June 2008
Ramakrishna Mission Residential College, University of Calcutta, Kolkata, India.

RESEARCH INTERESTS

Statistical Genomics; Bioinformatics; Multiple Hypothesis Testing; Grouped Hypothesis Testing; Test of Association; Kernel Methods in Statistics; Longitudinal Data Analysis; Multivariate Statistics; Nonparametric Methods.

PROFESSIONAL EXPERIENCE

Assistant Professor,
September 2018 - Present,
Department of Statistics
Oklahoma State University, Stillwater, OK.

Post Doctoral Scholar,
September 2015 - 2018,
Department of Biotatistics & Informatics
University of Colorado, Anschutz Medical Campus, CO.
Supervisor: Katerina Kechris and Debashis Ghosh.

Graduate Research Assistant August 2013 - August 2015.
The Genotype-Tissue Expression Project (GTEx) methodology R01 (A. Nobel

and F.A. Wright, co-PIs)
Supervisor: Fred A. Wright.

- Expression Quantitative Trait Locus (eQTL) data, Multiple testing.

Graduate Research Assistant August 2012 - July 2013.
The UNC Superfund Research Program, Biostatistics Core (J. Swenberg, PI)
Supervisor: Fred A. Wright.

- Regression Analysis, Cluster Analysis, GWAS.

Graduate Research Assistant August 2010 - July 2012.
EPA STAR Center for Computational Toxicology (A. Tropsha, PI)
Supervisor: Fred A. Wright.

- Dose-response analysis, Permutation tests, Microarray data.

Published papers

Rudra, P., Cruz-Cortes, E., Zhang, X., Ghosh, D. (2019). "Multiple testing approaches for hypotheses in integrative genomics". *Wiley Interdisciplinary Reviews: Computational Statistics*, Early view online: https://onlinelibrary.wiley.com/doi/abs/10.1002/wics.1493

Kordas, G., **Rudra, P.**, Hendricks, A., Saba, L., Kechris, K. (2019). "Insight into genetic regulation of miRNA in mouse brain" *BMC genomics*, 20(1), 849.

Schuyler, R.P., Jackson, C., Garcia-Perez, J.E., Baxter, R.M., Ogolla, S.O., Rochford, R., Ghosh, D., **Rudra, P.**, Hsieh, E.W.Y. (2019). "Minimizing Batch Effects in Mass Cytometry Data" *Frontiers in immunology*, 10, 2367.

Shi, W., Zhuang, Y., Russell, P., Hobbs, B.D., **Rudra, P.**, Vestal, B., Hersh, C.P., Saba, L., Kechris, K. (2019). "Unsupervised discovery of phenotype specific multi-omics networks" *Bioinformatics*, 35(21) 4336-4343.

Anantharajan, J., Zhou, Zhang, L., H., Hotz, T., Vincent, M.Y., Blevins, M., Jones, D., Jason, A.E., Kuan, J.W.L., Ng, E.Y., Khoon, Y.Y., Baburajendran, N., Lin, G., Hung, A.W., Joy, J., Patnaik, S., Marugan, J.,**Rudra, P.**, Ghosh, D., Hill, J., Kaylor, T.H., Zhao, R., Ford, H., Kang, C. (2019). "Structural and functional analyses of an allosteric Eya2 phosphatase inhibitor" *Molecular cancer therapeutics*, 18(9), 1484-1496

Oliphant, M.U., Vincent, M.Y., Galbraith, M.D, Pandey, A., Zaberezhnvv, V.,**Rudra, P.**, Johnson, K.R., Costello, J.C., Ghosh, D., DeGregori, J., Espinosa, J.M., Ford, H. (2019). "Six2 Mediates Late-stage Metastasis via Direct Regulation of Sox2 and Induction of a Cancer Stem Cell Program" *Cancer Research*, 79(4), 720-734.

Nedumaran, B., Pineda, R.H., **Rudra, P.**, Lee, S., Malykhina, A.P. (2019). "Association of genetic polymorphisms in the pore domains of mechano-gated TREK-1 channel with overactive lower urinary tract symptoms in humans." *Neurourology and Urodynamics*, 38(1), 144-150.

Rudra, P., Shi, W., Russell, P., Tabakoff, B., Hoffman P., Saba, L., Kechris, K. (2018). "Predictive Modeling of miRNA-mediated Predisposition to Alcohol-related Phenotypes in Mouse" *BMC genomics*, 19(1), 639

Rudra, P., Broadaway, K.A., Ware, E.B., Jhun, M.A., Bielak, L.F., Zhao, W., Smith, J.A., Peyser, P.A., Kardia, S.L., Epstein, M.P. and Ghosh, D. (2018). "Testing cross-phenotype effects of rare variants in longitudinal studies of complex traits". *Genetic epidemiology*, 42(4), 320-332.

Zhang, L., Zhou, H., Li, X., Vartuli, R., Rowse, M., Xing, Y., **Rudra, P.**, Ghosh, D., Zhao, R., Ford, H.L. (2018). "Eya3 Threonine Phosphatase Partners with PP2A to Induce c-Myc Stabilization and Tumor Progression". *Nature communications*, 9(1), 1047.

Russell, P., Vestal, B., Shi, W., **Rudra, P.**, Dowell, R.D., Radcliffe R.A., Saba, L., Kechris, K. (2018). "miR-MaGiC improves quantification accuracy for small RNA-seq". *BMC Research Notes*, 11(1), 296.

Vartuli, R., Zhou, H., Zhang, L., Powers, R.K., Klarquist, J., **Rudra, P.**, Vincent, M.Y., Ghosh, D., Costello, J.C., Kedl, R.M., Slansky, J.E., Zhao, R., Ford, H.L. (2018). "Eya3 promotes breast tumor-associated immune suppression via threonine phosphatase-mediated PD-L1 upregulation". *The Journal of Clinical Investigation*, 128(6).

Rudra, P.*, Vestal, B.*, Shi, W.*, Russell, P., Odell, A., Dowell, R.D., Radcliffe, R., Saba, L., Kechris, K. (2017). "Model Based Heritability Scores for High-throughput Sequencing Data". *BMC Bioinformatics*, 18(1), 143. [*Equal contribution]

Rudra, P., Zhou, Y., Wright, F.A. (2017). "A Procedure to Detect General Association Based on Concentration of Ranks". *Stat*, 6(1), 88-101.

O'Gorman W.E., Kong D.S., Balboni I.M., **Rudra, P.**, Bolen C.R., Ghosh, D., Davis M.M., Nolan G.P., Hsieh E.W.Y. (2017). "Mass Cytometry Identifies a Distinct Monocyte Cytokine Signature Shared by Clinically Heterogeneous Pediatric SLE Patients". *Journal of Autoimmunity*, 81, 74-89.

Getahun, A., Wemlinger, S., **Rudra, P.**, Santiago, M., van Dyk, L., and Cambier, J. (2017). "Impaired B Cell Function During Viral Infections due to

PTEN-mediated Inhibition of the PI3K Pathway". *Journal of Experimental Medicine*, 214(4), 931-941.

Nedumaran, B., **Rudra, P.**, Burnham, E.L., Meacham, R.B., Malykhina, A.P. (2017). "Impact of Regular Cannabis Use on Biomarkers of Lower Urinary Tract Function". *Urology*, 109, 223.e9-223.e16.

Rudra, P., Sen, P.K., Burdine, J., Sen, S. (2016). "Effect of Stroke Prevention Medication on Aortic Atheroma Progression Assessed Using New Statistical Paradigm". *Journal of Medical Statistics and Informatics*, 4(1), 4.

Work in progress

Rudra, P., Wright, F.A., Nobel, A., "A Random Effects Model and Testing Procedure for Group-level FDR Control." (Under preparation)

Wilson, H.P., Cooley, B., Chatterjee, S., Pierre, A., **Rudra, P.**, Dorsey, A.W., Riley, P., Velez, M., Majumder, M., "A Novel Application of Protein S in Adjunct Therapy for Hemophilia B." (Under preparation)

Rudra, P., Ghosh, D., Hsieh, E.W.Y., "A Kernel-based Approach for the Analysis of High Dimensional Mass Cytometry Data." (In progress)

Radcliffe, R.A., Dowell, R.D., Odell A., Richmond, P., Bennet, B., Larson, C., Kechris, K., **Rudra, P.**, Shi, W.,"Ethanol-Specific Effects on the Genetic Regulation of Gene Expression: Potential Relationship to Acute Ethanol Tolerance."(In progress)

Das, N., **Rudra, P.**, Giri A., "Effect of Monsoon Rain on the Arsenic Exposure Through Drinking Water in the Population of West Bengal, India." (In progress).

Fisher, A., Das, N., Giri A., **Rudra, P.**, "Role of Arsenic Contamination in genetic damage" (In progress).

Technical Reports

Bose, S., Pal, A., Mallick, J., Kumar, S. and **Rudra, P.**, "A Hybrid Approach for Improved Content-based Image Retrieval using Segmentation." (Technical report, BIRU/2012/3, Indian Statistical Institute)

Packages developed

Shi, W., Russell, P., **Rudra, P.**, Vestal, B., Kechris, K., Saba, L., "Heritability of Gene Expression for Next-Generation Sequencing (HeritSeq)" (CRAN)

Honors and Awards

The Kalyani Sen International Student Scholarship in Biostatistics, UNC-CH (2014-15)

The Fryer Fellowship, Department of Biostatistics, UNC-CH (2012-14)

Gillings Merit Scholarship, School of Public Health, UNC-CH (2010-11)

Sabyasachi Roy Memorial Gold Medal for the best project work in second year of M.Stat, Indian Statistical Institute (2010-11)

Award for the top rank in the university for bachelor degree in statistics, University of Calcutta (2005-08)

Invited Presentations

"Control of False Discoveries in Grouped Hypothesis Testing for eQTL Data" Invited Talk, Department of Industrial Engineering and Management, Oklahoma State University, OK (October 2019).

"Bayesian networks in integrative genomics: An example with a recombinant inbred mouse panel" Invited Talk, Department of Integrative Genomics, Oklahoma State University, OK (September 2019)

"Control of False Discoveries in Grouped Hypothesis Testing for eQTL Data" Invited Talk, WNAR (Western North American Region of International Biometric Society) annual meeting, Portalnd, OR (June 2019).

"Simulation of Cross-phenotypic Effects of Rare Variants Across Time", Invited Talk, Open Science Grid All-Hands Meeting 2018, Salt Lake City, UT (March 2018).

Other Presentations

"Statistical learning with high-dimensional mass cytometry data", Contributed poster presentation, Annual Conference of International Indian Statistical Association, Mumbai, India (December 2019).

"Statistical learning with high-dimensional mass cytometry data", Contributed poster presentation, Pacific Symposium on Biocomputing, Big Island, HI (January 2019).

"Control of False Discoveries in Grouped Hypothesis Testing for eQTL Data", Contributed poster presentation, International Conference on Multiple Comparison Procedures, Riverside, CA (June 2017).

"Predisposition to Alcohol Related Phenotypes Mediated by microRNA Expression", Contributed poster presentation, Research Society of Alcoholism Annual Meeting, Denver, CO (June 2017).

"Controlling False Discovery Rate for Grouped and Hierarchical Hypothesis Testing: Recent Advancements", Statistical Genomics Working Group, University of Colorado, Anschutz Medical Campus, CO (May 2017).

"Predisposition to Alcohol Related Phenotypes Mediated by microRNA Expression", Contributed Talk, Bioinformatics Journal Club, University of Colorado, Anschutz Medical Campus, CO (January 2017).

"A microRNA eQTL study in a panel of recombinant inbred mouse strains", Contributed poster presentation, National Institute on Drug Abuse Genetics Consortium Meeting, Rockville, MD (December 2016).

"A microRNA eQTL study in a panel of recombinant inbred mouse strains", Contributed poster presentation, Research Society of Alcoholism Annual Meeting, New Orleans, LA (June 2016).

"Studying the genetics of microRNA expression for alcohol related traits", Contributed poster presentation, International Conference on Quantitative Genetics, Madison, WI (June 2016).

"Model-based Heritability Scores for High-throughput Sequencing Data", Contributed Talk, ASA CO/WY Chapter Spring Meeting, University of Colorado, Boulder, CO (April 2016).

"Measuring and Testing Heritability", Contributed Talk, Bioinformatics Journal Club, University of Colorado, Anschutz Medical Campus, CO (March 2016).

"Effect of Stroke Prevention Medication on Aortic Atheroma Progression.", Contributed poster presentation, The Butcher Symposium, Westminster, CO (November 2015).

"A Procedure to Detect General Association Based on Concentration of Ranks.", Invited talk, SAMSI, NC (February 2015).

"A Procedure to Detect General Association Based on Distance of Ranks.", Contributed poster presentation, JSM, Boston, MA (August 2014).

Collaborative Research Experience

Department of Integrative Biology Spring 2020.
Oklahoma State University.
Collaborator: Punidan Jeyasingh.

Department of Physiological Sciences Fall 2019.
College of Veterinary medicine
Oklahoma State University.
Collaborator: Ashish Ranjan.

Department of Pharmaceutical Sciences Fall 2016.
University of Colorado Denver, Anschutz Medical Campus.
Collaborator: Richard Radcliffe.

Department of Immunology and Microbiology Fall 2016.
University of Colorado Denver, Anschutz Medical Campus.
Collaborator: Andrew Getahun.

Department of Surgery Fall 2016.
University of Colorado Denver, Anschutz Medical Campus.
Collaborator: Balachandar Nedumaran.

Department of Pharmacology Fall 2016.
University of Colorado Denver, Anschutz Medical Campus.
Collaborator: Heide L. Ford.

Department of Immunology and Microbiology Spring 2016.
University of Colorado Denver, Anschutz Medical Campus.
Collaborator: Elena Hsieh.

Department of Neurology 2012-2016
University of South Carolina and Department of Biostatistics, University of North Carolina at Chapel Hill.
Collaborator: Souvik Sen.

Department of Nutrition Spring 2013.
University of North Carolina at Chapel Hill.
Collaborator: Karen Corbin.

Department of Biochemistry Spring 2013.
University of North Carolina at Chapel Hill.
Collaborator: Gerhard Meissner.

Teaching Experience

Instructor

- OSU, STAT 5083 — Spring 2020
  - Statistics for Biomedical Researchers.
- OSU, STAT 5013 — Fall 2018-19
  - Statistics for Experimenters-I.
- OSU, STAT 5023 — Spring 2019
  - Statistics for Experimenters-II.
- OSU, STAT 4043 — Fall & Spring 2018-19
  - Applied Regression Analysis.
- CU Anschutz, BIOS 6606 — Fall 2017
  - Statistics for Basic Sciences.

Guest Lecture

- CU Anschutz, BIOS 7659 — Fall 2016
  - Statistical Methods in Genomics
- CU Anschutz, BIOS 6640 — Spring 2016
  - Python and R in Data Science
- CU Anschutz, BIOS 7731 — Fall 2015
  - Advanced Mathematical Statistics-I

Teaching Assistant

- UNC-CH, BIOS 664: — Spring 2013
  - Sample Survey Methodology.
- UNC-CH, BIOS 662: — Fall 2012
  - Intermediate Statistical Methods.
- UNC-CH, BIOS 600 — Fall 2012
  - Principles of Statistical Inference.
- UNC-CH, BIOS 767 — Spring 2012
  - Longitudinal Data Analysis.

Mentoring Experience

- Masters student: Fisher Ankney — Current
- Masters student: Rashawn Howard — Current

Professional Activities

Committee Member — October 2019-Present.
WNAR member engagement committee, Western North American Region of International Biometric Society

Organizer — September 2016-2018.
Statistical Genomics Working Group, Department of Biostatistics and Informatics, University of Colorado, Anschutz Medical Campus.

PreK Grant Reviewer
Colorado Clinical and Transitional Sciences Institute, University of Colorado, Anschutz Medical Campus, 2016.

Publication Referee
BMC Bioinformatics, 2016; Bioinformatics, 2018.

Working Group Member September 2015-Present.
Statistical Genomics Working Group, Department of Biostatistics and Informatics, University of Colorado, Anschutz Medical Campus.

Working Group Member September 2015-2018.
Network Analysis Working Group, Department of Biostatistics and Informatics, University of Colorado, Anschutz Medical Campus.

Working Group Member September 2014-2015.
2014-15 Program on Beyond Bioinformatics: Statistical and Mathematical Challenges (Bioinformatics), SAMSI.

Professional Memberships

American Statistical Association. (2011-Present)
American Society of Human Genetics. (2018-Present)
International Indian Statistical Association. (2019-Present)
Internation Biometric Society (ENAR and WNAR). (2019-present)
International Society for Computational Biology. (2019-Present)
Statistics Without Borders. (2015-Present)

Software and Languages known

R, Matlab, SAS, C, Python.