

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 Science in Statistics,

August 2005 - June 2008

Ramakrishna Mission Residential College, University of Calcutta, Kolkata, India.

RESEARCH INTERESTS

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

PROFESSIONAL EXPERIENCE

Assistant Professor,

August 2018 - Present,

Department of Statistics

Oklahoma State University, Stillwater, OK.

Post Doctoral Fellow,

September 2015 - July 2018,

Department of Biostatistics & 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

1. **Rudra, P.**, Baxter, R., Hsieh, E. W., & Ghosh, D. (2021). Compositional Data Analysis using Kernels in Mass Cytometry Data. [bioRxiv](#).
2. Hiney, K., Sypniewski, L., **Rudra, P.**, Pezeshki, A., & McFarlane, D. (2021). "Clinical health markers in dogs fed raw meat-based or commercial extruded kibble diets". *Journal of Animal Science*, 99(6).
3. Radcliffe, R.A., Dowell, R.D., Odell A., Richmond, P., Bennet, B., Larson, C., Kechris, K., Saba, L.M., **Rudra, P.**, Shi, W. (2020). "Systems genetics analysis of the LXS recombinant inbred mouse strains: Genetic and molecular insights into acute ethanol tolerance". *PLOS ONE*, 15(10).
4. **Rudra, P.**, Cruz-Cortes, E., Zhang, X., Ghosh, D. (2020). "Multiple testing approaches for hypotheses in integrative genomics". *Wiley Interdisciplinary Reviews: Computational Statistics*, 12(6).
5. 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.
6. 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.
7. 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.
8. 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., Babura-jendran, 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.
9. Oliphant, M.U., Vincent, M.Y., Galbraith, M.D, Pandey, A., Zaberezhnyy, 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.
 10. Nedumaran, B., Pineda, R.H., **Rudra, P.**, Lee, S., Malykhina, A.P. (2019). "Association of genetic polymorphisms in the pore domains of mechanogated TREK-1 channel with overactive lower urinary tract symptoms in humans." *Neurourology and Urodynamics*, 38(1), 144-150.
 11. **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.
 12. **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.
 13. 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.
 14. 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.
 15. 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).
 16. **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]
 17. **Rudra, P.**, Zhou, Y., Wright, F.A. (2017). "A Procedure to Detect General Association Based on Concentration of Ranks". *Stat*, 6(1), 88-101.

18. 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.
19. 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.
20. 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.
21. **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

1. **Rudra, P.**, Baxter, R., Hsieh, E.W.Y., Ghosh, D., "Compositional Data Analysis using Kernels in Mass Cytometry Data." (Submitted to Bioinformatics)
2. Kaipa, Roha, M., Kennison, Sheila, M., **Rudra, P.**, "Sentence Processing in Trilinguals." (Submitted to Canadian Journal of Speech-Language Pathology & Audiology)
3. **Rudra, P.**, Wright, F.A., Nobel, A., "A Random Effects Model and Testing Procedure for Group-level FDR Control." (Under preparation)
4. Wilson, H.P., Pierre, A., Cooley, B., **Rudra, P.**, Dorsey, A.W., Chatterjee, S., Janbain, M., Velez, M., Majumder, R., "A Novel Application of Protein S in Adjunct Therapy for Hemophilia B." (Under preparation)
5. Sypniewski, L.A., Maxwell, L.K., Breshears, M., Ritchey, J., Fang, W.B., Moody, D., **Rudra, P.**, Murray, J.K., Kanda, I., Brandão, J., "Single and multi-dose pharmacokinetics of high concentration buprenorphine in New Zealand White rabbits (*Oryctolagus cuniculus*)." (Under preparation)
6. **Rudra, P.**, Lucas, A., Lawrence, I., Klug, A., McCullagh, E., "Comorbidities between auditory dysfunction and neurodevelopment disorders - a chart review study." (In Progress)

7. Ankney, F., Das, N., Giri A., **Rudra, P.**, "Role of Arsenic Contamination in genetic damage." (In progress)
8. Habiger, J., **Rudra, P.**, "A Mixture Model for Discrete Data." (In progress)
9. 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).

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)

ACTIVE GRANTS

1. "A Retrospective Study to Determine the Levels of Protein S, a Physiological Anticoagulant in COVID-19 Patients."
Role: Co-investigator (P.I.: R. Majumder), COVID-19 intramural research grant (LSUHSC School of Medicine)
2. "Does feeding raw meat based diet reduce intestinal inflammation in dogs?"
Role: Co-investigator (P.I.: D. McFarlane), OSU Vet Med internal grant: Red Account (RAC)

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

1. "Compositional Data Analysis using Kernels in Mass Cytometry Data" Accepted Invited Talk at WNAR (Western North American Region of International Biometric Society) annual meeting, Virtual conference (June 2021).
2. "Kernel Distance Covariance Approach for Testing Association in Longitudinal Studies" Accepted Invited Talk at the Annual Conference of International Indian Statistical Association, Virtual conference (May, 2021).
3. "Testing abundance of cell populations in high-dimensional mass cytometry data" Invited Talk, Online Statistics Seminar, University of Arkansas, AR (November 2020).
4. "Quantifying association in large biological data sets" Invited Talk, Indian Statistical Institute, Kolkata, India (January 2020).
5. "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).
6. "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)
7. "Control of False Discoveries in Grouped Hypothesis Testing for eQTL Data" Invited Talk, WNAR (Western North American Region of International Biometric Society) annual meeting, Portland, OR (June 2019).
8. "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

1. "Statistical learning with high-dimensional mass cytometry data", Contributed poster presentation, Annual Conference of International Indian Statistical Association, Mumbai, India (December 2019).
2. "Statistical learning with high-dimensional mass cytometry data", Contributed poster presentation, Pacific Symposium on Biocomputing, Big Island, HI (January 2019).
3. "Control of False Discoveries in Grouped Hypothesis Testing for eQTL Data", Contributed poster presentation, International Conference on Multiple Comparison Procedures, Riverside, CA (June 2017).

4. "Predisposition to Alcohol Related Phenotypes Mediated by microRNA Expression", Contributed poster presentation, Research Society of Alcoholism Annual Meeting, Denver, CO (June 2017).
5. "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).
6. "Predisposition to Alcohol Related Phenotypes Mediated by microRNA Expression", Contributed Talk, Bioinformatics Journal Club, University of Colorado, Anschutz Medical Campus, CO (January 2017).
7. "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).
8. "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).
9. "Studying the genetics of microRNA expression for alcohol related traits", Contributed poster presentation, International Conference on Quantitative Genetics, Madison, WI (June 2016).
10. "Model-based Heritability Scores for High-throughput Sequencing Data", Contributed Talk, ASA CO/WY Chapter Spring Meeting, University of Colorado, Boulder, CO (April 2016).
11. "Measuring and Testing Heritability", Contributed Talk, Bioinformatics Journal Club, University of Colorado, Anschutz Medical Campus, CO (March 2016).
12. "Effect of Stroke Prevention Medication on Aortic Atheroma Progression.", Contributed poster presentation, The Butcher Symposium, Westminster, CO (November 2015).
13. "A Procedure to Detect General Association Based on Concentration of Ranks.", Invited talk, SAMSI, NC (February 2015).
14. "A Procedure to Detect General Association Based on Distance of Ranks.", Contributed poster presentation, JSM, Boston, MA (August 2014).

COLLABORATIVE
RESEARCH
EXPERIENCE

Computer science 2021-Present.
Oklahoma State University.
Collaborator: Thanh Thieu.

Communication Sciences and Disorders 2020-Present.
Oklahoma State University.
Collaborator: Roha Kaipa.

Department of Integrative Biology 2020-Present.
Oklahoma State University.
Collaborator: Punidan Jeyasingh.
Collaborator: Elizabeth McCullagh.

Biochemistry and Molecular Biology 2020-Present.
Louisiana State University.
Collaborator: Rinku Majumder.

Department of Physiological Sciences 2019-Present.
College of Veterinary medicine, Oklahoma State University.
Collaborator: Ashish Ranjan.
Collaborator: Dianne McFarlane.
Collaborator: Lara Sypniewski.
Collaborator: Mike Schoonover.
Collaborator: Danielle Dugat.

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

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 Neurology University of South Carolina. Collaborator: Souvik Sen.	2012-2016
Department of Nutrition University of North Carolina at Chapel Hill. Collaborator: Karen Corbin.	Spring 2013.
Department of Biochemistry University of North Carolina at Chapel Hill. Collaborator: Gerhard Meissner.	Spring 2013.

TEACHING EXPERIENCE

Instructor

- OSU, STAT 5083 Spring 2020
– Statistics for Biomedical Researchers.
- OSU, STAT 5013 Fall 2018-21
– Statistics for Experimenters-I.
- OSU, STAT 5023 Spring 2019
– Statistics for Experimenters-II.
- OSU, STAT 4043-5543 Fall & Spring 2018-21
– 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 Graduated, 2020
- 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 2018-Present.
Statistics Department Seminar, Oklahoma State University.

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, Bioinformatics, Biometrics, The American Statistician,
Metabolites, Cancers.

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)
International Biometric Society (ENAR and WNAR). (2019-present)
International Society for Computational Biology. (2019-Present)

Statistics Without Borders. (2015-Present)

SOFTWARE AND
LANGUAGES R, Matlab, SAS, C, Python.
KNOWN