

# Vivek Ruhela

## Postdoctoral Research Scientist, Columbia University

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## Research Statement

Computational biologist investigating how genomic variation and artificial intelligence converge to decode the biology of complex diseases. I develop scalable and reproducible pipelines for genetics (Runs of Homozygosity (ROH), Genome-wide Association Study (GWAS), and expression quantitative trait loci (eQTL) fine-mapping) and genomic modeling (bio-inspired GCN frameworks, integrative transcriptomic-genetic analysis, and end-to-end bioinformatics workflows) to uncover disease mechanisms across diverse populations.

## Education

- 2018 – 2024    **PhD., Computational Biology**, IIIT-Delhi  
Research Area – Cancer Genomics.  
Thesis title: *Design and development of AI-based computational tools for identifying predictive biomarkers and signaling pathways for blood cancer.*  
Advisors: Prof. Anubha Gupta (IIIT Delhi) and Prof. (Dr.) Ritu Gupta (AIIMS, Delhi)
- 2014 – 2016    **M.Tech., Instrumentation & Control** ZHCET, Aligarh Muslim University.  
CPI – 9.0 (First Class Honours)  
Thesis title: *Detection of Brain tumor in Brain MRI (Magnetic Resonance Imaging).*  
Advisor: Prof. Yusuf Uzzaman Khan
- 2006 – 2010    **B.Tech. Electrical Engineering**, BSACET College, AKTU.  
Marks – 68.78%
- 2003 – 2004    **12<sup>th</sup> Std., P.D.D.S.V.M, Vrindavan.**  
Board – C.B.S.E.  
Marks – 74.40%
- 2001 – 2002    **10<sup>th</sup> Std., P.D.D.S.V.M, Vrindavan.**  
Board – C.B.S.E.  
Marks – 79.20%

## Research Experience

- May 2024 – Till Now    **Postdoctoral Research Scientist**  
Department of Neurology, Columbia University Irving Medical Center (CUIMC), New York, USA.  
*Project:* Genetic fine-mapping of Alzheimer's disease using multi-omics integration, Runs of Homozygosity (ROH), and eQTL analysis across diverse populations.  
*Key Contributions:* Developed scalable pipelines for ROH detection, ancestry-specific meta-analysis, and eQTL-GWAS colocalization across populations.

## Research Experience (continued)

- 2018 – 2024  **Doctoral Researcher (Ph.D. in Computational Biology)**  
Indraprastha Institute of Information Technology Delhi (IIIT-Delhi), India.  
*Thesis:* AI-driven biomarker discovery and genomic modeling in Multiple Myeloma.  
*Key Contributions:* Developed *miRPipe*, *miRSim*, and *Bio-DGI* frameworks for small-RNA sequencing and AI-based multi-omics integration to identify novel biomarkers distinguishing MGUS and MM.
- 2015 – 2016  **Graduate Researcher (M.Tech. Thesis)**  
Aligarh Muslim University (AMU), Aligarh, India.  
*Thesis:* Detection of brain tumors in MRI using image processing and machine learning techniques.  
*Tools:* MATLAB, SVM, and feature extraction methods for biomedical imaging.

## Teaching

- Jan 2017 – Dec 2017  **Assistant Professor** Electrical and Electronics Dept., PSIT.
- Aug 2016 – Dec 2016  **Assistant Professor.** Electrical Department, Sanskriti University.
- Oct 2012 – March 2013  **Course Instructor (Ad-hoc)** Electrical Department, ADKMP College.
- Jan 2013 – March 2013  **Lecturer(Ad-hoc)** Electrical Department, BSA College.
- Aug 2010 – Sept 2012  **Lecturer.** Electrical Department, Mangalayatan University.

## Research Publications

### Journal Articles

- 1 Cieza, B., Pandey, N., **Ruhela, Vivek**, Ali, S., & Tosto, G. (2025). **SAGA (Simplified Association Genomewide Analyses)**: A user-friendly pipeline to democratize genome-wide association studies. *bioRxiv*, 2025-08.  doi:<https://doi.org/10.1101/2025.08.25.672146>
- 2 **Ruhela, Vivek**, Gupta, R., Oberoi, R., & Gupta, A. (2025). A comprehensive targeted panel of 295 genes: Unveiling key disease initiating and transformative biomarkers in multiple myeloma. *Computers in Biology and Medicine*, 196, 110619.  doi:<https://doi.org/10.1016/j.compbio.2025.110619>
- 3 **Ruhela, Vivek**, Jena, L., Kaur, G., Gupta, R., & Gupta, A. (2023). BDL-SP: A bio-inspired dl model for the identification of altered signaling pathways in multiple myeloma using wes data. *American Journal of Cancer Research*, 13(4), 1155. Retrieved from  <https://pmc.ncbi.nlm.nih.gov/articles/PMC10164815/>
- 4 Farswan, A., Gupta, A., Jena, L., **Ruhela, Vivek**, Kaur, G., & Gupta, R. (2022). Characterizing the mutational landscape of mm and its precursor mgus. *American journal of cancer research*, 12(4), 1919. Retrieved from  <https://pubmed.ncbi.nlm.nih.gov/35530275/>
- 5 **Ruhela, Vivek**, Gupta, A., Sriram, K., Ahuja, G., Kaur, G., & Gupta, R. (2022). A unified computational framework for a robust, reliable, and reproducible identification of novel mirnas from the rna sequencing data. *Frontiers in Bioinformatics*, 2, 842051.  doi:10.3389/fbinf.2022.842051
- 6 **Vivek Ruhela**, Gupta, R., Krishnamachari, S., Ahuja, G., & Gupta, A. (2021). miRSim: Seed-based Synthetic Small Non-coding RNA Sequence Simulator. *Zenodo*. <https://doi.org/10.5281/zenodo.6546356>.  doi:<https://doi.org/10.5281/zenodo.6546356>

- 7 **Ruhela, Vivek**, Farswan, A., Gupta, A., Sriram, K., Kaur, G., & Gupta, R. (2021). P-035: Ai-based models for the identification of critical genetic biomarkers to distinguish mm from mgus using the wes data. *Clinical Lymphoma Myeloma and Leukemia*, 21, S57. [doi:10.1016/S2152-2650\(21\)02169-8](https://doi.org/10.1016/S2152-2650(21)02169-8)
- 8 Kaur, G., **Ruhela, Vivek**, Rani, L., Gupta, A., Sriram, K., Gogia, A., ... Gupta, R. (2020). Rna-seq profiling of deregulated mirs in cll and their impact on clinical outcome. *Blood cancer journal*, 10(1), 1–9. [doi:10.1038/s41408-019-0272-y](https://doi.org/10.1038/s41408-019-0272-y)

## Conferences

- 1 Pandey, N., **Ruhela, Vivek**, Cieza, B., Barral, S., Samper-Ternent, R., Montesinos, R., ... Tosto, G. (2025). Genome-wide meta-analysis of cognitive performances in hispanics/latinos identifies novel rare variant locus pcats. In *Alzheimer's & parkinson's diseases conference*. Retrieved from <http://dx.doi.org/10.13140/RG.2.2.24659.90407>
- 2 **Ruhela, Vivek**, Cieza, B., Mayeux, R., Reyes-Dumeyer, D., Teich, A. F., & Tosto, G. (2025). Genetic colocalization of expression quantitative trait loci (eqtl) mapping and gwas in a multiethnic brain bank: An insight into ancestry-specific regulatory architecture in alzheimer's disease. In *Alzheimer's association international conference*. ALZ. Retrieved from <https://alz.confex.com/alz/2025/meetingapp.cgi/Paper/107199>
- 3 **Vivek Ruhela**, Panday, N., Cieza, B., Barral, S., Samper-Ternent, R., Montesinos, R., ... Tosto, G. (2025). Fine mapping of regions of homozygosity and their role in alzheimer's disease: Insights from the peruvian and mexican populations. In *Alzheimer's & parkinson's diseases conference*. Retrieved from <https://doi.org/10.13140/RG.2.2.15642.15048>
- 4 **Ruhela Vivek**, Yang, Z., Jacobson, S. W., Jacobson, J. L., Meintjes, E. M., Tosto, G., & Carter, R. C. (2024). Gene by prenatal alcohol exposure interaction effects on growth and cognition in mother- child dyads in a south african birth cohort. In *American society of human genetics (ashg)*. Retrieved from <http://dx.doi.org/10.13140/RG.2.2.17434.56006>

## Skills

|           |                                                                |
|-----------|----------------------------------------------------------------|
| Languages | Strong reading, writing and speaking competencies for English. |
| Coding    | MATLAB, Python, R, Bash, Awk, $\LaTeX$                         |
| Misc.     | Academic research, teaching, training                          |

## Miscellaneous Experience

### Awards and Achievements

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| 2010 | <b>Competition Prize for Outstanding Performance in MATLAB Code Challenge</b> , BSA Engg. College. |
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### Certification

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| 2017 | <b>Medical Image Analysis</b> . Elite certification in NPTEL Online certification.                |
|      | <b>Enhancing Soft Skills and Personality</b> . Elite certification in NPTEL Online certification. |

## References

Available on Request