

# Kunal Mishra, Ph.D.

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 [kunal-mishra](#) |  [Google Scholar](#) |  [freeribosomes](#)

## BIO

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Computational biologist with expertise in systems genetics and multi-omics integration, spanning bulk, single-cell, and spatial transcriptomics. I lead kidney-focused research from computational discovery to experimental validation, with a focus on identifying causal genes and pathways in chronic kidney disease.

## SKILLS

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- **Computational and Programming:** R, Python, Bash, Snakemake, Git; reproducible workflow development, statistical modelling, data visualisation, high-performance computing environments
- **Omics and Systems Biology:** Bulk, single-cell, and spatial transcriptomics; multi-omics integration; systems genetics, QTL mapping, genetic association analysis, metabolomics
- **Experimental:** Cell culture, qPCR, IF/IHC, RNA-seq library preparation (bulk and single-cell); mouse and rat models

## EDUCATION

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- **Doctor of Philosophy (Ph.D.) in Computational Biology** Aug 2021 - Nov 2025  
*Centre for Computational Biology, Duke-NUS Medical School* Singapore
  - Analyzed and integrated multi-omics datasets to study the role of macrophages in chronic kidney disease (the subject of my thesis)
  - Performed all computational analyses and end-to-end wet lab validation of computational findings
- **Bachelor of Science (BSc. Hons.) in Biological Sciences and Medicinal Chemistry** Aug 2017 - Jul 2021  
*Nanyang Technological University* Singapore
  - Graduated with Distinction, Cumulative GPA: 4.42 / 5.00
  - Relevant Coursework: Bioinformatics Methods I & II, Metabolomics and Lipidomics, Advanced Immunology, Molecular & Cell Biology I & II, Organic Chemistry I-III, Drug Discovery and Development

## EXPERIENCE

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- **Computational Research Fellow** Dec 2026 - Present  
*Behmoaras Lab, Centre for Computational Biology, Duke-NUS Medical School* Singapore
  - Lead kidney-focused research projects integrating systems genetics, multi-omics analysis, and experimental validation to identify causal genes and pathways in chronic kidney disease
  - Develop and apply reproducible computational pipelines for bulk, single-cell, and spatial transcriptomic analyses
  - Communicate findings through internal and external presentations and through first-author and co-author manuscripts for peer-reviewed publication
- **Bioinformatics Research Intern** May 2020 - Aug 2021  
*Prabhakar Lab, Genome Institute of Singapore, A\*STAR* Singapore
  - Developed and improved the performance of a novel single-cell feature selection algorithm (DUBStepR, Nature Communications, 2021)
  - Analysed single-nuclei transcriptomes from human fetal brains (Simons Foundation Autism Research Initiative-funded project)
  - Analyzed pilot Rheumatoid Arthritis Single-Cell RNA Sequencing data

## RESEARCH WORK

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‡ DENOTES EQUAL CONTRIBUTION

### Publications

- [1] Wong BH, **Mishra K**, Chin CF, Galam DLA, Tan BC, Behmoaras J, Chua AWC, Silver DL. **Mfsd2a is important for maintaining epidermal homeostasis** (2026). *PNAS*, 123(8). DOI: 10.1073/pnas.2531159123
- [2] Chen T‡, Quinn Z‡, **Mishra K‡**, O'Connor EC‡, Silver SE, Zhang Y, Valencia MJ, Mei Y, Behmoaras J, Ferreira LMR, Chatterjee P. **moPPI: De novo generation of motif-specific and functionally active peptide binders via discrete flow matching** (2026). *bioRxiv*. doi:10.1101/2024.07.31.606098
- [3] Yen YH, Chew G, Chong CM, Nithianandam V, Kang PJ, Wee H, Yuan F, **Mishra K**, Behmoaras J, Cheung C, Zeng L, Su H, Ng ASL, Feany MB, Zhang SC. **FLT1-ICD loss orchestrates endothelial senescence and vascular dysfunction in Alzheimer's disease** (2025). (In Review)

- [4] Ouyang JF<sup>‡</sup>, **Mishra K<sup>‡</sup>**, Xie Y, Park H, Huang KY, Petretto E, Behmoaras J. **Systems-level identification of a matrisome-associated macrophage polarisation state in multi-organ fibrosis** (2023). *eLife*, 12:e85530. DOI: 10.7554/eLife.85530
- [5] Ranjan B, Sun W, Park J, **Mishra K**, Schmidt F, Xie R, Alipour F, Singhal V, Joanito I, Honardoost MA, Yong JMY, Koh ET, Leong KP, Rayan NA, Lim MGL, Prabhakar S. **DUBStepR is a scalable correlation-based feature selection method for accurately clustering single-cell data** (2021). *Nature Communications*, 12:5849. DOI: 10.1038/s41467-021-26085-2

### Conference Presentations

- [1] **Systems genetics identifies a podocyte activity network in diabetic nephropathy** (2025). Poster presentation. *ASN Kidney Week*, Houston, USA.
- [2] **Spatial transcriptomics profiling of lupus nephritis patients identifies fibroblast proximity as a driver of SPP1<sup>+</sup> macrophage polarization** (2025). Poster presentation. *Human Cell Atlas (General Meeting)*, Singapore.
- [3] **Spatial resolution of macrophage heterogeneity in lupus nephritis kidneys** (2024). Poster presentation. *2nd Spatial Biology Congress: Asia*, Singapore.
- [4] **Systems genetics in diabetic nephropathy for causal gene identification** (2024). Oral Presentation. *Duke-NUS Cardiovascular and Metabolic Disorders Symposium*, Singapore.
- [5] **Quantitative trait loci mapping of diabetic kidney disease phenotypes in an F2-cross population of Akita-Renin mice** (2024). Poster presentation. *DYNAMO Townhall*, Singapore.
- [6] **Understanding the spatiotemporal activity and role of SPP1<sup>+</sup> profibrotic macrophages in kidney disease** (2023). Poster presentation. *Duke-NUS Ph.D. Student Symposium*, Singapore.
- [7] **Screening anti-cancer compounds for drug repurposing and anti-malarial therapy** (2019). Oral presentation. *International Conference of Undergraduate Research*, Singapore.
- [8] **Identification of novel inhibitors for the malaria parasite *Plasmodium falciparum*** (2019). Oral presentation *Australasian Conference for Undergraduate Research*, Australia.

### HONORS AND AWARDS

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| <ul style="list-style-type: none"> <li>• <b>Centre for Technology and Development Grant (SGD 50,000)</b><br/><i>Duke-NUS Medical School</i></li> <li>◦ Title: <i>Design and optimization of lead peptide candidates for fibrotic diseases</i></li> </ul>  | 2026 |
| <ul style="list-style-type: none"> <li>• <b>Best Lightning Talk – Advances in Cardio-renal-metabolic Diseases</b><br/><i>Duke-NUS Medical School</i></li> <li>◦ Title: <i>Systems Genetics in Diabetic Nephropathy for Causal Gene Identification</i></li> </ul>  | 2024 |
| <ul style="list-style-type: none"> <li>• <b>Best Poster Award – Ph.D. Student Symposium</b><br/><i>Duke-NUS Medical School</i></li> <li>◦ Title: <i>Understanding the spatiotemporal activity and role of SPP1<sup>+</sup> profibrotic macrophages in kidney disease</i></li> </ul>   | 2023 |
| <ul style="list-style-type: none"> <li>• <b>Khoo Pre-Doctoral Fellowship (Scholarship; ~SGD 480,000)</b><br/><i>Duke-NUS Medical School</i></li> <li>◦ Scholarship funding 4 years of stipend support and tuition</li> </ul>  | 2021 |
| <ul style="list-style-type: none"> <li>• <b>NISTH-Micron Responsible AI Grant (SGD 5,000)</b><br/><i>Nanyang Technological University</i></li> <li>◦ Title: <i>Development of an interactive device for the elderly for prediction of dementia</i></li> </ul>   | 2019 |
| <ul style="list-style-type: none"> <li>• <b>Best Oral Presentation – Australasian Conference of Undergraduate Research</b><br/><i>The University of Newcastle</i></li> <li>◦ Title: <i>Identification of novel inhibitors for the malaria parasite <i>Plasmodium falciparum</i></i></li> <li>◦ Received a travel grant (SGD 1,000) from NTU to present research overseas</li> </ul> | 2019 |
| <ul style="list-style-type: none"> <li>• <b>Presidential Research Scholar</b><br/><i>Nanyang Technological University</i></li> <li>◦ Awarded for undergraduate research accomplishments with merit</li> <li>◦ Title: <i>Identification of novel inhibitors for the malaria parasite <i>Plasmodium falciparum</i></i></li> </ul>   | 2019 |
| <ul style="list-style-type: none"> <li>• <b>Mr. and Mrs. Kwok Chin Yan Award for Student Initiative (SGD 1,000)</b><br/><i>Nanyang Technological University</i></li> <li>◦ Awarded for the <i>Code For Good</i> initiative by the NTU Open Source Society</li> <li>◦ Led as President (2019–2020)</li> </ul>  | 2019 |

## MEDIA

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- **SGH to lead \$5.8m research project to combat deadly autoimmune disease**

*The Straits Times; Singapore General Hospital (SGH)*

2024



- **Scanning scars, Duke-NUS scientists find a 'scarcode' common across organs**

*Duke-NUS NewsHub*

2023



## ADDITIONAL INFORMATION

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**Languages:** English (Proficient), Hindi (Proficient), Indonesian (Conversational), French (Elementary)

**Interests:** Music (Guitar, Classical Flute), Photography