



# AYUSH AGGARWAL

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aggarwal-ayush.github.io 



## SUMMARY

PhD candidate (final stages of thesis submission) in the field of skin pigmentation, skilled in computational as well as experimental biology, looking for bioinformatics postdoctoral opportunities.



## EDUCATION

**PhD candidate | CSIR-Institute of Genomics and Integrative Biology, Delhi**

AUGUST 2017 – PRESENT

Supervisor – Dr Vivek T Natarajan

Thesis – Understanding the cell fate decisions governing melanocyte cell state transitions

**B.E. BIOTECHNOLOGY | Netaji Subhas Institute of Technology (Delhi University)**

2011 – 2015

Relevant courses – Molecular Biology, Recombinant DNA Technology, Intro to C and SQL

Thesis – Therapeutic Potential of Some Selected Plant Species



## KEY SKILLS

- Big (omics) data analysis and visualization
- R/Shiny programming and High-Performance computing
- Mammalian and bacterial cell culture
- Flow cytometry
- Single cell/ChIP sequencing and analysis
- High content imaging and analysis (ImageJ scripting)
- Others like ChIP, qPCR, ICC etc.



## EXPERIENCE

**PhD candidate | CSIR-Institute of Genomics and Integrative Biology, Delhi**

AUGUST 2017 – PRESENT

Research Experience

- Designing and execution of experiments
- **Dry Lab Experience**
  - Analyzed **single-cell, bulk RNA, and ChIP sequencing** data, starting from bcl files to final figures, using R and high-performance computing.
  - Analyzed multiple publicly available single-cell and bulk RNA sequencing and ChIP-seq data using R.
  - Developed a **shiny web application** for exploration of multiple melanocyte related bulk and single-cell datasets including an option to visualize your own data.
- **Wet Lab Experience**

- Performed **single-cell RNA/multiomics and ChIP sequencing** from start to end including culturing of cells, library preparation, and sequencing.
  - Gained expertise in **mammalian and bacterial cell culture** and techniques like (imaging) **flow cytometry, high content imaging, ICC, ChIP, qPCR**, and molecular cloning etc.
- Training
  - Trained PhD and undergraduate students in cell culture, cloning and single-cell data analysis.
- Volunteer experience
  - IGIB open day for high school and undergraduate students.
- Other
  - Created and maintaining the lab website and handling lab's data submission on public platforms.

## **Project Fellow | CSIR-Institute of Genomics and Integrative Biology, Delhi**

OCTOBER 2015 – JULY 2017

Supervisor – Dr Rajesh S Gokhale

My aim was to understand the transcriptional regulation of genes involved in fatty acid metabolism in *Mycobacterium* spp. for which around 20 GFP reporter clones containing the promoters of relevant genes were created and electroporated into *M. smegmatis* to understand the transcriptional activation of fatty acid metabolism genes under different conditions including biofilm.



## **PUBLICATIONS**

- One of my first author manuscript is currently under preparation.
- **Aggarwal, A.**, Nasreen, A., Sahoo, S., Faruq, M., Pandey, R., Jolly, M.K., Singh, A., Gokhale, R.S., Natarajan, V.T., 2023. Melanocytes Exhibit Distinct Cell States Governed by A Gene Regulatory Network Under Stochastic Influence. <https://doi.org/10.1101/2023.05.10.540111> (in submission process)
- Sultan, F., Basu, R., Murthy, D., Kochar, M., Attri, K.S., **Aggarwal, A.**, Kumari, P., Dnyane, P., Tanwar J., Motiani R.K., Singh, A., Gadgil, C., Bhavesh, N.S., Singh, P.K., Natarajan, V.T., Gokhale, R.S., **2022**. Temporal analysis of melanogenesis identifies fatty acid metabolism as key skin pigment regulator. **PLoS Biol** **20(5)**: e3001634
- Sharma, B., Subramaniam, Y.J., Raja, D.A., **Aggarwal, A.**, Sivasubbu, S., Natarajan, V.T., **2022**. Reverse Genetic Approach to Identify Regulators of Pigmentation using Zebrafish. **JoVE J. Vis. Exp.** e62955.
- Dhawan, U.K., Bhattacharya, P., Narayanan, S., Manickam, V., **Aggarwal A.**, Subramanian, M., 2021. Hypercholesterolemia Impairs Clearance of Neutrophil Extracellular Traps and Promotes Inflammation and Atherosclerotic Plaque Progression. **Arteriosclerosis, Thrombosis, and Vascular Biology**. 41, 2598–2615.
- Oh S, Abdelnabi J, Al-Dulaimi R, **Aggarwal A**, Ramos M, Davis S, Riester M, Waldron L, **2020**. HGNCHELPER: identification and correction of invalid gene symbols for human and mouse [version 1; peer review: 2 approved, 1 approved with reservations]. **F1000Research**. 9:1493
- Raja, D. A., Subramaniam, Y., **Aggarwal, A.**, Goherwal, V., Babu, A., Tanwar, J., Motiani, R. K., Sivasubbu, S., Gokhale, R. S., & Natarajan, V. T. (2020). Histone variant dictates fate biasing of neural crest cells to melanocyte lineage. **Development**, dev.182576.

- Grover, R., Burse, S.A., Shankrit, S., **Aggarwal, A.**, Kirty, K., Narta, K., Srivastav, R., Ray, A.K., Malik, G., Vats, A., Motiani, R.K., Thukral, L., Roy, S.S., Bhattacharya, S., Sharma, R., Natarajan, K., Mukerji, M., Pandey, R., Gokhale, R.S., Natarajan, V.T., **2019**. Myg1 exonuclease couples the nuclear and mitochondrial translational programs through RNA processing. **Nucleic Acids Res.** 47, 5852–5866.



## CONFERENCES AND WORKSHOPS

- Selected for oral presentation at Genes 2023 - Single-Cell Genomics Moving Forward (2023)
- Aggarwal, A, Singh, A, Gokhale, RS, Natarajan, VT. (2022). Uncovering the shades of grey in the black and white lives of melanocyte | Poster presentation at IGIB Science Festival
- Virtual workshop “The Linux Command Line: From Basic Commands to Shell Scripting” (2021) organized by Bioinformatics Core, University Medical Center, Hamburg.
- EMBL-EBI virtual course “Single-cell RNA-seq analysis using R” (2021) including giving a lightning talk.
- Aggarwal, A, Singh, A, Gokhale, RS, Natarajan, VT. (2019). Low density culturing of B16 stochastically induces melanocyte cell state transitions | Poster presentation at All India Cell Biology Conference
- IITM-EBI workshop on Mathematical Modelling at IIT Madras and presented a poster of my work (2019).



## ACCOLADES

- BMES-Cell and Molecular Bioengineering (CMBE) Graduate Student Travel Award | 2023
- 56th rank in joint CSIR-UGC test for Junior Research Fellowship (NET) | 2016
- 94.59 percentile in graduate aptitude test in engineering (GATE-BT) | 2016
- Merit scholarship award for performance in final year examination of B.E. | 2015-16
- 317 score in GRE general test | 2014
- 19999 rank out of 1.1 million students in All India Engineering Entrance Examination | 2011



## UNDERGRADUATE PROJECTS AND INTERNSHIPS

- Bachelor Thesis Project, Netaji Subhas Institute of Technology, New Delhi  
FEBRUARY 2015 – JUNE 2015  
“Therapeutic Potential of Some Selected Plant Species” under the supervision of Dr. Akhilesh Dubey and Prof. Ashok K. Dubey
- Summer Training, Netaji Subhas Institute of Technology, New Delhi  
JUNE – JULY 2013 and JULY 2014  
Extraction of phytochemicals and their analysis using thin layer chromatography, and isolation and screening of bio-surfactant producing microorganisms under the supervision of Prof. Ashok K. Dubey



## OTHER ACTIVITIES

- Volunteer, GENMEDSKIN 2016, International Conference on the theme “Genomic Medicine in Skin Research” organized by Systems Biology Group, CSIR-IGIB
- Volunteer, Largest Practical Science Lesson, India International Science Festival, 2015
- Organized and participated in technical/cultural festival during under-graduation



## REFERENCES

### Dr. Vivek T. Natarajan

Associate Professor, Academy of Scientific and Industrial Research

Senior Principal Scientist, CSIR – IGIB, Delhi, India

[tnvivek@igib.in](mailto:tnvivek@igib.in)

### Dr. Rajesh S. Gokhale

Secretary, Department of Biotechnology, Government of India

Formerly Scientist VII, National Institute of Immunology

[rsg@nii.ac.in](mailto:rsg@nii.ac.in)

### Dr. Manikandan Subramanian

Group Leader, Cardiovascular Inflammation

Deputy Director of Research, The William Harvey Research Institute

Barts and The London School of Medicine

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## CONTACT

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