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VASUNDHARA AGRAWAL

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Doctoral candidate with a solid background in regenerative engineering, cancer biomarker discovery, and epigenomics, a strong publication record in chromatin imaging and mechanistic studies, and the ability to work with diverse teams.

EDUCATION

Northwestern University, Evanston, IL
Ph.D. Candidate in Biomedical Engineering – Imaging & Biophotonics 2017 - 2023
Certificate in Research Communication, Research Communication Training Program (RCTP)
- **Fellowships:** Fellowship in Leadership (2020) | Walter P. Murphy Fellowship (2017)

Illinois Institute of Technology (IIT), Chicago, IL
B.S. in Biomedical Engineering – Cell & Tissue Engineering *(Summa Cum Laude)* 2013 - 2017
- **Scholarships:** Toprani Research Scholarship (2016) | ARC Scholar (2015) | International Student Scholarship (2013)

RESEARCH & TEACHING EXPERIENCE

- **Backman Lab, Northwestern University: Graduate Student Researcher** Fall 2017 – Spring 2023
  - Utilized nanoscale imaging and sequencing to engineer adaptive cell response to external stimulus.
  - Performed ML-based analysis of 3D chromatin structure to determine cancer biomarkers in clinical samples.
  - Created custom software to perform image processing and transcriptional analysis on large datasets.

- **Ameer Lab, Northwestern University: Graduate Student Research Collaborator** Fall 2017 – Spring 2023
  - Led a project on epigenomic reprogramming to study chromatin conformation for regenerative engineering.
  - Designed and conducted imaging and functional genomics assays in stem cells to enhance bone regeneration.

- **Biomedical Engineering Department, Northwestern University: Guest Instructor** Winter 2023
  - Prepared and conducted lectures for a 400-level course in cardiac physiology and cell reprogramming applications.

- **Northwestern Prison Education Program: Course Instructor** Fall 2021
  - Taught a comprehensive course in Epigenetics in partnership with the Cook County Department of Corrections.

- **Biomedical Engineering Department, Northwestern University & IIT: Teaching Assistant** Spring 2020 & 2017
  - Supervised lab sessions and mentored 40+ students in Quantitative Experimentation and Design.
  - Delivered presentations on Image Processing, held office hours, and trained 30+ students in MATLAB.

- **Medical Imaging Research Center (MIRC), IIT: Research Assistant** Spring 2016 – Fall 2016
  - Optimized quantitative molecular phenotyping of cell-surface tumor biomarkers using mathematical modeling.
  - Co-built an analysis software to identify key parameters to improve accuracy in experimental protocols.

LEADERSHIP & PROFESSIONAL DEVELOPMENT

- **Team Leader, Center for Leadership at Northwestern University** Winter 2022
  - Lead a quarter-long fellowship program for graduate students on discovering strengths-based leadership and conducted group discussions to understand frameworks of leadership and teamwork.

- **Mentor, Research Engagement Student Group, Niles West High School** Fall 2021
  - Mentored high school students in doing independent STEM research in planarian regeneration. Mentee, Kareem Dibs earned gold awards in the state science fair for both poster and paper competitions.

- **Extern, Mars & Co – Global Strategy Consulting Firm** Winter 2021
  - Shadowed senior consultants and practiced cases in strategy consulting as a part of the NU Externship program.

- **Vice President of Communications & Marketing, Advanced Degree Consulting Alliance** Fall 2020 – Fall 2021
  - Collaborated with consulting firms and professional development programs to organize case workshops. Created the website, designed surveys to integrate membership feedback, and increased membership by 58%.

AWARDS, HONORS & MEMBERSHIPS

- Reviewer, Optica (formerly Optical Society of America) Since 2022

- Member, Society of Women Engineers. Since 2022
- Member, Biophysical Society Since 2019
- IIT Armour College of Engineering Medal for Biomedical Research 2017
- Society of Women Engineers Region H Research Competition - Best in Show 2017
- Tau Beta Pi Engineering Honor Society, Member Since 2016
- Undergraduate Research Expo Winner, IIT 2016

★ SKILLS

- Key Skills:
  - A background in molecular biology, specifically in stem cell and cancer epigenomics research.
  - Hypothesis testing and designing experimental approaches to understand key mechanisms.
  - Culturing and conducting live cell imaging and sequencing experiments in various cell types, including, mesenchymal stromal cells, and induced pluripotent stem cells, and inducing differentiation to various lineages.
  - Experience in performing imaging studies on etoposide and radiation-induced senescence.
  - Performing functional genomics experiments and omics analyses, particularly in sequencing and chromatin-based assays.
  - Extensive background and experience in high-resolution electron microscopy and fluorescence imaging.
  - ML-based processing for chromatin conformation datasets in cancer and stem cells treated with pharmacological compounds to perturb epigenetic modifications.
  - Managing clinical experiments to determine cancer biomarkers using nanoscale chromatin imaging techniques.
  - Statistical Analysis and data visualization tools to communicate complex research ideas to a general audience.

- Molecular Techniques: Hi-C, ATAC-Seq, RNA-Seq, library preparation and analysis, flow cytometry, and FISH.
- Imaging: Sample preparation and imaging for Scanning and Transmission Electron Microscopy (TEM and STEM), confocal microscopy, and Partial Wave Spectroscopic (PWS) Microscopy.
- Applications: Microsoft Office, Adobe Photoshop, ImageJ, IMOD, and MATLAB (Image Processing Toolbox).
- Languages: Strong in Python, MATLAB, and R.

PATENT & PUBLICATIONS

- Wang, X.*, **Agrawal, V.*,** et al. "Biophysical reprogramming of chromatin accelerates bone regeneration". Nature BME (March 2023, Accepted for Publication).
- Li, Y.*, **Agrawal, V.*,** et al. "Analysis of three-dimensional chromatin packing domains by chromatin scanning transmission electron microscopy (ChromSTEM)". *Scientific reports* (2022).
- **Agrawal, V.*,** Wang, X., et al. "Chromatin Reprogramming via Contact Guidance-Induced Nuclear Deformation Promotes Stem Cell Differentiation". *OSA Technical Digest (Optical Society of America). Bio-Optics: Design and Application* (2021).
- Bugter, O.*, Li, Y., Wolters, A.H., **Agrawal, V.,** et al. "Early Upper Aerodigestive Tract Cancer Detection Using Electron Microscopy to Reveal Chromatin Packing Alterations in Buccal Mucosa Cells". *Microscopy and Microanalysis* (2021).
- Daneshkhah, A.*, **Agrawal, V.*,** et al. "Evidence for possible association of vitamin D status with cytokine storm and unregulated inflammation in COVID-19 patients." *Aging Clinical and Experimental Research* (2020).
- Huang, K.*, Li, Y., Shim, A.R., Virk, R.K., **Agrawal, V.,** Eshein, A., et al. "Physical and data structure of 3D genome". *Science advances* (2020).
- Mass, P., Shah, N., **Agrawal, V**., and Tong, Y. "Foldable walker." U.S. Patent 10,857,056 issued December 8, 2020.