Harshita Kumar

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EDUCATION

MS, Systems Biology and Bioinformatics, August 2024 - May 2025, Case Western Reserve University, Cleveland
- Thesis: Investigating microRNA regulators in oligodendroglioma

B.S.E, Biomedical Engineering, August 2019 - May 2023, Case Western Reserve University, Cleveland
- Senior Project: A Device for Reducing the Tactile and Visual Stressors of Needle Based Procedures
- Minors: Computer Science, Pre-med
- Dean's High Honor list (2019-20, 2022-23)

RESEARCH EXPERIENCE

Research Technician II (May 2023 – Present)
Supervisor(s): Andrew Dhawan, MD, DPhil and Jacob Scott, MD, DPhil — Cleveland Clinic
Project: Identifying microRNAs that regulate the EGFR pathway in glioblastoma
- Preprocessing of publicly available RNA and microRNA array (Affymetrix chip) data for differential expression analysis; utilizing rank product methodology and gene networks
- Overexpressing microRNAs in cell lines through lentiviral transfection
- Measuring changes in EGFR pathway activity (RNAseq, qPCR, and western blots)

Project**:** Utilizing machine learning techniques on activity sensor data for symptom detection in glioblastoma
- Time-series data pre-processing, Taken's embedding, feature engineering, and hidden Markov models
- Supervised classification of publicly available WISDM dataset

Project: Evolving resistance to temozolomide in patient-derived glioblastoma cell lines
- Characterizing change in baseline response and understanding mechanism through cell cycle analysis

Undergraduate Research Assistant (March 2022 – June 2023)
Supervisor: John Letterio, MD — Case Comprehensive Cancer Center
Project: Pan-cancer regulation via the NRF2 pathway
- Identifying NRF2-regulated genes through differential expression (RNA-Seq data), cancer cell line genetic characterization (TCGA data from cBioportal), and validation of transcription factor binding sites
- NRF2 regulation by triterpenes in cell models: using cell-titer glo assays, western blots, and GVHD protocol

Undergraduate Research Assistant (April 2022 – May 2023)
Supervisor: Musa Audu, PhD — VA Medical Center
Project: Machine learning for the development of a feedback controller for patients with spinal cord injuries
- Feed forward neural network to predict joint angles from inertial sensor acceleration data
- Gait statistical measure calculations (e.g. gait stability and variation indexes)

JOURNAL PAPERS

Luo G, Kumar H, et al. A Core NRF2 Gene Set Defined Through Comprehensive Transcriptomic Analysis Predicts Selective Drug Resistance and Poor Multicancer Prognosis. Antioxid Redox Signal. 2024 Aug 8.

Dhawan A, Kumar H, et al. Phenotypic Clustering in Tuberous Sclerosis Complex Reveals Four Distinct Disease Trajectories. Under Review.

INVITED ORAL PRESENTATIONS

Identifying microRNA regulators of the EGFR pathway in glioblastoma (Oral presentation)
American Academy of Neurology Annual Meeting 2024 in Denver, CO

POSTERS

Investigating temozolomide resistance in glioblastoma using a clinically relevant dosing regimen (Poster)
Society of Neuro-Oncology Annual Meeting 2024 in Houston, TX

Clinical Drivers of Patient Oxygenation State in Hidden State Markov Chain Modeling. (Poster)
Annual Biomedical Research Conference for Minoritized Scientists 2024 in Pittsburgh, PA

WORKSHOPS

Mathematical Modelling of Cancer Treatments, Resistance, Optimization
The Fields Institute for Research in Mathematical Sciences, Toronto, CA

Professional Development Scholars, CWRU

TEACHING EXPERIENCE

Teaching Assistant: MATLAB and Thermodynamics (Jan 2022 – June 2023) CWRU

- Guiding and designing weekly recitations/ office hours centered on important concepts, and problem-solving techniques
- Grading labs for correctness and understanding

Mentorship of 2 undergraduate students (Nov 2023 – Present), taking a lead role in guiding them through:

- Experimental techniques, experimental plan, analysis plan, poster preparation, drafting manuscript

PRIMARY MENTORSHIP OF UNDERGRADUATE STUDENTS

Current Student (September 2023 – Present)

- Teaching a range of lab techniques while aligning them to broader project goals

Summer student (May 2024 – September 2024)

- Taught foundational experimental and data analysis techniques
- Guided preparation for presenting work at a local poster conference

COMMUNITY ENGAGEMENT

- Crisis Text Line Volunteer (2022 - Present): Supporting 30+ individuals, evaluating texter risk, and building safety plans
- Rise Up: Northeast Ohio scientific officer (2023 – Present): Editing student grant proposals, holding study sections, and writing experiment protocols
- Clinical Shadowing (Oncology) at University Hospitals (2022-2023): Observing surgeries, appointments, and weekly tumor boards.
- Student Representative at CWRU: Faculty Senate Committee (2021), Undergraduate Student Government (2019-2020)

SKILL SUMMARY

Experimental:

- Cell Culture, Mouse work, Experimental design
- Proliferation assays, Biochemical assays, Immunoassays
- qPCR, lentiviral transfection

Computational:

- Statistical analysis, Image Analysis
- Neural Networks, Machine Learning
- R, Python, MATLAB, Java, ImageJ
- Engineering ISO standards

Languages:

- English (fluent)
- Hindi (fluent)
- Mandarin (advanced)
- Spanish (advanced)
- German (intermediate)