

Mrinal Pandey

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PROFESSIONAL SUMMARY

Ph.D. candidate in Biological Engineering at Cornell University with 7+ years of oncology-focused research experience. Expert in **tumor microenvironment, mechanotransduction, and translational oncology models**, integrating **microfluidics, 3D tumor spheroids, RNA sequencing, and imaging** to uncover mechanisms of cancer progression. Skilled in cross-disciplinary collaboration, experimental design, and dissemination of high-impact findings. Dedicated to advancing oncology drug discovery through rigorous science, innovation, and teamwork.

EDUCATION

Cornell University — Ph.D. Candidate, Biological Engineering (GPA 3.9/4.0)

Jan 2020 – Present, Ithaca, NY, USA

- Member of Alpha Epsilon – Biological Engineering Honors Society

KTH Royal Institute of Technology — M.S., Medical Biotechnology (GPA 4.5/5)

Aug 2017 – Oct 2019, Stockholm, Sweden

RESEARCH EXPERIENCE

Cornell University — Ph.D. Candidate & Research Assistant

Jan 2020 – Present, Ithaca, NY

- Led research on **mechanical regulation of tumor invasion and immune evasion** in 3D breast cancer organoid models.
- Applied a custom microfluidic compression platform to quantify viscoelastic properties of 3D breast tumor organoids and investigate how mechanical forces influence cellular signaling.
- Integrated **bulk RNA sequencing, NK cell co-culture assays, and quantitative immunofluorescence** to dissect compression-mediated regulation of **STAT1 signaling and immune evasion mechanisms** in breast cancer.
- Generated insights into **ECM remodeling, mechanotransduction, and tumor-immune interactions** that align with clinical drivers of progression and therapeutic resistance.

SciLifeLab — Master's Thesis Researcher

Sept 2018 – June 2019, Stockholm, Sweden

- Developed and validated immunoassays for host cell protein detection using microfluidics, ELISA, and mass spectrometry.
- Enhanced assay sensitivity and specificity — experience relevant to biomarker assay development.

CORE COMPETENCIES

Oncology & Translational Biology

- Tumor microenvironment, invasion assays, mechanotransduction, STAT1/immune signaling, ECM remodeling

Molecular & Analytical

- RNA sequencing, qPCR, immunofluorescence, ELISA, western blotting, cytokine assays

Quantitative & Imaging

- Microfluidics, confocal microscopy, live-cell imaging, computational data integration

Collaboration & Communication

- Scientific writing, interdisciplinary teamwork, conference presentations, student mentoring

LEADERSHIP & PROFESSIONAL DEVELOPMENT

- **COLMAN Inclusive Leadership Fellow**, Cornell University — 2024
Selected for a competitive fellowship program focused on building inclusive leadership skills and fostering diversity in STEM.
- Engaged in structured workshops and collaborative discussions aimed at enhancing team performance, equity, and belonging in scientific environments.

WE Lead (Women in Engineering Leadership Program), Cornell University — 2023

- Participated in a selective leadership program designed to advance women leaders in engineering and technical disciplines.
- Trained in strategic decision-making, negotiation, and leading complex technical teams.

International Student Ambassador, KTH Royal Institute of Technology — 2018–2019

- Represented the Medical Biotechnology program globally; provided mentorship to prospective students on academics, research, and life in Sweden.

SELECTED PUBLICATIONS & PRESENTATIONS

- Mechanical compression regulates tumor spheroid invasion into a 3D collagen matrix — Physical Biology, 2024.
- Enhanced extracellular matrix remodeling due to embedded spheroid fluidization — New Journal of Physics, 2025.
- Decoding physical principles of cell migration under controlled environment using

microfluidics — Biophysics Reviews, 2024.

- Viscoelastic properties of tissue spheroids revealed by a microfluidic rheometer — GRC Physical Science of Cancer, 2025.

ONGOING RESEARCH

- STAT1 Signaling Under Mechanical Stress: Linking microenvironmental compression to immune signaling modulation in breast tumor organoids using RNAseq and immunostaining — exploring translational biomarker potential. (manuscript in preparation)

- Viscoelasticity in Tumor Organoids: Quantitative mechanical phenotyping to understand tumor stiffness as a predictor of invasive and therapeutic response behavior. (manuscript in preparation)