Kaustubh Joshi

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Education

Cockrell School of Engineering, University of Texas at Austin — Austin, TX
Doctor of Philosophy (Mechanical Engineering, Regenerative Medicine and Mechanobiology) — *Aug. 2026 – 2032*

School of Pharmacy, University of Maryland — Baltimore, MD
Master of Science in Pharmaceutical Science — *Aug. 2023 – May 2025*

School of Pharmacy, D Y Patil University — Pune, India
Bachelor of Pharmacy in Pharmaceutical Science — *June 2019 – June 2023*

Experience

Research Technologist — April 2025 – Present
Translational Tissue Engineering Center, Wilmer Eye Institute, Johns Hopkins Medicine — *Baltimore, MD*

- Generating a stem cell bank of over 30 human patient derived iPSC lines, optimizing cell culture conditions (media formulations, inhibitors, extracellular matrix coatings) to maximize pluripotency and viability, expanding, passaging, and cryopreserving stem cells under strict aseptic conditions.
- Generating cerebral, retinal, brainstem, olfactory placode, spinal and vascular endothelial organoids; performing scheduled media changes, growth-factor dosing, and maturation monitoring up to 150 days.
- Generating first-in-kind novel human brain assembloids from control iPSCs that recreate brain cytoarchitecture and maintain mature synaptic activity (120 days), establishing a physiologic platform for neurodegenerative studies.
- Fusing region-specific organoids into multi-region "assembloids" to model long-range neuronal connectivity and neurovascular interactions.
- Developing a co-culture system with patient-derived JHH-DIPG1 cells; employing live-cell imaging and multielectrode arrays to quantify tumor infiltration, neuronal viability, and network electrophysiology in real time.
- Conducting immunostaining, confocal imaging, and multielectrode array recordings to assess structural and electrophysiological maturation.
- Preparing samples for scRNA-seq and bulk RNA-seq for lineage quantification to identify potential drug targets and assess the efficacy and toxicity of drugs.
- Performing cell toxicity assays in various plate formats to assess compound safety and cell viability.
- Maintaining detailed electronic lab notebooks (ELN), writing and updating SOPs, managing reagent inventory and instrument maintenance schedules.
- Training rotation students and new technicians in aseptic technique, iPSC maintenance, and organoid protocols and presenting data at weekly laboratory meetings and institute seminars.
- Comparing 2D versus 3D model performances for psychiatric disease readouts (schizophrenia and autism derived organoids) and documenting differential gene expression profiles.
- Collaborating with external companies to coordinate RNA-seq, whole exome sequencing (WES), and IHC data analysis, including obtaining quotes, managing tissue logistics, and facilitating project pricing.
- Collaborating with the Emory University School of Medicine to screen 15 investigational compounds on healthy vs. glioblastoma tumor-bearing organoids, assessing proliferation, invasion, apoptosis, and functional readouts, thereby validating the model as a predictive preclinical assay for CNS drug discovery.
- Collaborating with multiple academic and government (U.S. Department of Defense) laboratories, translating in vitro findings into preclinical development strategies.
- Supported grant strategy from ideation to submission: gap analysis vs. review criteria, power/sample-size inputs with statisticians, and structured "response to prior reviews" for resubmissions.

Peer Reviewer — Nov 2025 – Present
Analytical Biochemistry, Elsevier — *Remote*

- Invited to serve as a peer reviewer for Analytical Biochemistry, evaluating manuscript quality, scientific rigor, and methodological validity for publication consideration.

- Critically assess submitted research articles, providing constructive feedback to authors and editorial recommendations to advance scientific publishing standards.

Research Advisor and Mentor Oct 2025 – Present

Johns Hopkins University *Baltimore, MD*

- Provide guidance on navigating academic research opportunities, connecting undergraduate students with faculty laboratories and research programs.
- Advise students on graduate school applications, research career pathways, and professional development in academic settings.
- Mentor students in developing research skills, including literature review, experimental design, and data analysis techniques.
- Support students in preparing research presentations, posters, and manuscripts for conferences and publications.
- Collaborate with E-Board members to organize research symposia, networking events, and programming that promotes undergraduate research engagement.
- Facilitate workshops and training sessions on research methodologies, academic writing, and presentation skills for undergraduate researchers.
- Foster an inclusive research community by promoting equitable access to research opportunities for undergraduates from diverse backgrounds.

Affiliate Reviewer and Program Ambassador June 2025 – Present

International Society for Stem Cell Research (ISSCR) *Remote*

- Reviewed 20+ abstracts for AI and Digital Biology Symposium (Oct. 2025) and delivered confidential, criteria-based evaluations and met all deadlines. Ongoing reviewer for upcoming scientific conferences.
- Promote conferences and scientific sessions, connect attendees across institutions, and steward an online community for scientists to exchange ideas and plan meetups.
- Promote abstract submission deadlines, and submission opportunities across different channels; curate concise previews/recaps and resource guides to support engagement.

Research Associate Co-op June 2024 – April 2025

GlaxoSmithKline (GSK) *Collegeville, PA*

- Cross-validated a transporter-mediated hepatic uptake assay using suspension and plateable hepatocytes to accurately predict in vivo behavior from in vitro data.
- Supported GSK's efforts in screening investigational compounds using bidirectional MDCK-MDR1, and BCRP assays to assess drug permeability and efflux.
- Performed metabolic stability assays for determining the intrinsic clearance of test compounds in cryopreserved suspension dog, rat, mouse, monkey, minipig, and human hepatocytes.
- Cultured MDCK-MDR1 and BCRP-MDCK cells to predict CNS penetration, prepared buffers and media for determining apical and basolateral uptake for evaluating the role of P-gp and other transporters in new chemical entities.
- Cultured H929 (cancer cell line) for an in vitro uptake study for a lead ADC candidate project.
- Contributed to Tier-1 and Standard in vitro early drug discovery studies using automated liquid handlers (Tecan), including hepatocyte clearance and uptake, microsomal clearance and binding and MDCK permeability.
- Designed and tailored scripts on Fluent Control as per the number of studies and plates, maintained ELNs and delivered in vitro results with a focus on high quality and rapid turnaround.
- Characterized the non-specific binding (unbound fraction) of GSK test compounds in human and rat microsomes using a rapid equilibrium dialysis method and analyzed them using TIBCO Spotfire.
- Performed protein quantification post-hepatocyte uptake studies using the BCA assay, including generating a protein calibration curve and measuring absorbance with a microplate reader.
- Assessed cell confluence using an inverted phase-contrast Zeiss microscope to monitor cell growth and experiment readiness.
- Independently documented experimental data in ELN and presented updates to the team.
- Proactively liaised with stakeholders (e.g., BioIVT) to discuss any assay challenges and implement solutions, enhancing the performance and reliability of in vitro DMPK assays.
- Trained new employees by explaining the scientific rationale behind each experimental step, while introducing them to laboratory protocols and advanced automation equipment like high-throughput liquid handlers.

- Assessed bioanalytical parameters including precision, accuracy, sensitivity, specificity, linearity, and stability to ensure data integrity and methodological robustness.

Research Assistant Oct. 2023 – June 2024

Dr. Jace Jones Lab, University of Maryland School of Pharmacy *Baltimore, MD*

- Optimized methods for oligonucleotide analysis, utilizing buffer exchange, Matrix-Assisted Laser Desorption/Ionization Time-of-Flight (MALDI-TOF) mass spectrometry, LC-MS, and nanodrop techniques.
- Assisted and executed multi-step solid phase extraction (SPE) for lipid isolation and oligonucleotide preparation.
- Observed and compared Hydrophilic Interaction Liquid Chromatography (HILIC) in negative and positive ionization modes with RPLC to assess optimal resolution in lipid analysis.
- Processed lipidomic analysis data from MS and UPLC systems using Tracefinder, Xcalibur and Excel.
- Supported and contributed in characterizing diastereomeric separation of phosphorothioated oligonucleotides using Ion Pair Reverse Phase (IPRP), Metal Ion Complexation Chromatography (MICC), and Reverse Phase Strong Anion Exchange (RP-SAX) Chromatography, gaining foundational knowledge in advanced chromatographic techniques.

Research Intern Aug. 2022 – Oct. 2022

Department of Occupational Health and Safety, Department of Defense *New Delhi, India*

- Conducted research on the effects of radio-wave exposure on molecular markers pertaining to inflammation, heat shock proteins, metabolism, and cell survival and apoptosis in Sprague Dawley rats.
- Euthanized rats, performed perfusions, to collect blood, brain, and skin for ex vivo studies.
- Prepared tissue homogenates using ultrasonication and homogenization for estimation of biochemical markers, resolved and detected the extracted protein using immunoblotting.
- Estimated endogenous total ROS, LPO, AOPP, SOD, and catalase levels using Lowry's method. Quantified metabolic regulatory enzymes like HK, LDH, CS, G6PD.
- Employed different ELISAs for the quantification of TNF-α, IL-1β, NOS2/iNOS, COX-2, NF-κB, 4-HNE adduct.
- Operated the RF signal generator in an anechoic chamber, ensuring accurate exposure conditions.

Publications

1. VN Vattipally, P Kramer, K Troumouchi, S Shiino, N Abouelseoud, **K Joshi**, R Xu, N Theodore, H Brem, C Bettegowda, LL Jantzie, S Robinson, TD Azad, A Kathuria. *Engineered neuroglial organoids as living neural interfaces for restorative neurosurgery.* Neurosurg Focus. (2026). doi: 10.3171/2025.11.FOCUS25911.
2. Ofria L.D.L, Sosnowski D.W, **Joshi K**, Maher B.S, Kathuria A. *Dual transcriptomic and epigenomic signatures of THC exposure in human prefrontal cortex development.* Genome Medicine. Under Review.
3. Pantula A, **Joshi K**, Kathuria A. *Transforming brain organoids into functional platforms: convergence of engineering, imaging, and ethics.* Advance Science. Under Review.
4. Pantula A, **Joshi K**, Kathuria A. *Multi-region human brain organoids enable phenotypic screening for neurodegenerative therapies.* In Preparation.
5. **Joshi K**, Pantula A, Kathuria A. *Comprehensive characterization of human iPSC-derived olfactory organoids reveals transcriptomic and functional maturity for neurodegenerative disease modeling.* In Preparation.

Posters and Presentations

1. **Joshi K**, Kathuria A. A brain organoid-based platform to target H3K27 gliomas. Translational Tissue Engineering Center Annual Symposium, Johns Hopkins Medicine, 2025.
2. **Joshi K**, Aravindhan K, Reilly M, Roethke T. Cross validating update mediated clearance in plated and suspended rat and human hepatocytes. University of Maryland Graduate Symposium, 2024.
3. Aravindhan K, **Joshi K**, Reilly M, Roethke T. Performance assessment-adjustment cycle to ensure precise liquid delivery during high-throughput screening. GlaxoSmithKline Automation Days, 2024.

Awards and Invited Talks

1. **Cockrell Graduate Fellow**. Cockrell School of Engineering, The University of Texas at Austin — Highly competitive merit-based fellowship ($24,000) awarded in addition to standard graduate stipend support. (2026)
2. **Elected Associate Member (Invited)**. Sigma Xi – The Scientific Research Honor Society (2026)
3. **Johns Hopkins TTREC Rising Star Award for Research Excellence**. Brain organoid-guided drug discovery in H3K27 gliomas. Translational Tissue Engineering Center Annual Symposium. Translational Tissue Research & Engineering Center (TTREC), Johns Hopkins Medicine. (2025)
4. **Invited talk at the Albert H. Owens Auditorium, Sidney Kimmel Comprehensive Cancer Center, Johns Hopkins Medicine.** Brain organoid-based platform to target H3K27 gliomas. (2025)

Skills and Interests

Laboratory Skills: Mammalian Cell Culture, Stem Cell Culture, Organoid Cell Culture, Immunohistochemistry (IHC), Animal Surgery, Animal Husbandry, Tumor Engraftment, Immunoblotting, ELISA, Imaging, LC-MS/MS (QQQ and QTOF), Automated Liquid Handlers (Tecan), GC-MS, UV-Vis, HPLC, RP-HPLC, HILIC, Normal Phase, UPLC, FT-IR, RNA and DNA Isolation, BCA, ADME Assays, Nanoparticle (LNP) Synthesis, Confocal Microscopy, MALDI-TOF, SEM, TEM, In Vitro, In Vivo, Ex Vivo Studies.

Programming & Software: TraceFinder, Xcalibur, Chromeleon, ChemDraw, PyMOL, SciFinder, BioRender, Python, Microsoft Office, GraphPad Prism, ImageJ.

Other Interests: Chess, Tennis, Running, Psychology, Philosophy.