Khushi Doshi

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Education

Johns Hopkins University — *Baltimore, MD*

M.S. *Biomedical Engineering* — 08/2024 - 05/2025 (Expected)

BITS Pilani — *Rajasthan, India*

B.E. *Chemical Engineering* | M.Sc. *Biological Sciences* — 08/2018 - 07/2023

Publications & Pre-prints

P1 **Ultrasensitive and Long-Lasting Luminescence Cascade Sensor for Point-of-Care Viral Pathogen Detection**

S. Kim, G. Cho, J. Lee, **Khushi Doshi**, S. Gharpure, J. Kim, J. Gwak, J. Hardie, Y. Song, Daniel Kuritzkes, Athe Tsibris, Hadi Shafiee

Nature Biomedical Engineering (Accepted, to appear)

P2 **COVID-19 Pandemic: Mechanism, Diagnosis and Treatment**

V. Kumar, **Khushi Doshi**, W.H. Khan, Anurag Singh Rathore

Journal of Chemical Technology & Biotechnology

Key Skills

Wet Lab	ELISA | PCR | Assay Development and Optimization | Next-Generation Sequencing | Western Blotting | Mammalian Cell Culture Techniques & Assays *(THP-1, U-937, Calu-1, LUDLU-1)* | Ex-vivo Mouse Culture *(PBMC Isolation from Whole Blood, Splenocyte Isolation, Bone Marrow Cell Extraction)* | Gel Electrophoresis | Molecular Cloning Techniques | HTRF | Physiological and Biochemical Characterization of Microbial Cultures | Biosafety and Handling Patient Samples *(BSL2+ Compliance)*
Instruments	Spectrometers *(UV-Vis, Fluorescence, FT-IR)* | TLC | Gas Chromatography | Luminometer
Dry Lab	GraphPad Prism | ImageJ | AutoCAD | Ansys Fluent | Basic Programming, Data Analysis & Visualization *(MATLAB, Python)* | Scientific Writing and Presentation *(Manuscript preparation & editing)*

Work Experience

cRASL-Sequencing for High-Throughput and Multiplexed Viral RNA Detection — Aug. '24 - Present

Laboratory for Precision Immunology, JHU — Dr. Ben Larman

- Co-lead of the cRASL-seq project for viral RNA detection, involving viral lysis and RNA capture through hybridization of oligonucleotide probes, subsequent probe ligation, PCR amplification, and next-generation sequencing for high-throughput detection
- Designed and evaluated probe sets with ProbeIT software, while performing genome and probe analysis, and mapping in Python for precise viral RNA targeting and amplification.
- Currently optimizing cRASL-seq assay for multiplexed detection of Dengue 1-4 and Zika viruses

In-Vitro Anti-Cancer Drug Discovery — Feb. '24 - Jun. '24

Glenmark Pharmaceuticals, Ichnos Glenmark Innovation, Mumbai

- Conducted literature review to understand signaling pathways *(IL-1R/TLR)* and identify immune modulators that increase the expression of proinflammatory cytokines in myeloid cells, enhancing the cytotoxicity of T-lymphocytes for effective cancer-immunotherapy
- Performed biochemical assays, such as HTRF and DNA unwinding assay using fluorometric substrates, to screen potent therapeutic compounds against cancer targets
- Tested cancer cells with selected PROTAC compounds, generating dose-response curves and evaluating parameters such as cytotoxicity and target protein degradation. Performed ELISAs to measure cytokine elevation and potentiation in drug-treated vs untreated cells. Processed ex-vivo samples *(Isolation of PBMCs, Splenocytes and BMDCs*) to evaluate similar parameters

Ultrasensitive Antigen-Based Point-of-Care Diagnostics — Jul. '22 - Jul. '23

Division of Engineering in Medicine, Brigham & Women's Hospital, Harvard Medical School — Dr. Hadi Shafiee

- Developed and optimized LUCAS: LUminescence CAscade-based Sensor, an enzyme cascade system capable of rapidly detecting analytes with ultrahigh sensitivity and prolonged bioluminescence

- Actively engaged in troubleshooting the challenges faced during assay development. Helped implement it on a fully automated, portable and user-friendly platform featuring a microfluidic cartridge with pre-loaded reagents and a cost-effective reader
- Implemented the protocol for testing SARS-CoV-2, HIV, HBV, and HCV. Selected the best antibody pairs against target antigen and carried out bioconjugation reactions of nanoparticles and immunogens. Achieved over 95% accuracy in the qualitative classification of 177 viral-infected patient samples and 50 viral-spiked serum samples *(Accepted in Nature BME [P1])*

Selected Projects and Labwork

Immunoengineering Lab Oct. '24 (Ongoing)

Lab course, JHU

- Hands-on experience in immune cell culture techniques, immunofluorescence labeling and imaging, inflammatory pathway stimulation, and immune-induced cytotoxicity, along with data collection, analysis, interpretation and scientific writing
- Experiments will include culturing and maintaining human cell lines, immunofluorescent labeling for protein localization, manipulation of inflammatory pathways via Toll-like Receptor signaling, and using co-culture systems with NK cells to assess immune-mediated cytotoxicity

Microfluidic Platforms for Droplet Synthesis Jun. '21 - Aug. '21

Nanomedicine and Drug Delivery Laboratory, University of Colorado Denver Dr. Uday Kompella

- Designed a solvent extraction channel, with 4 inlets, a fusion chamber and a collection reservoir. Simulated the mixing of silicone oil, water and DCM in the chip to generate droplets in Ansys Fluent
- Performed the mixing of silicone oil and water in a T-chip. Modified the design and added a laminated water stream in order to extract droplets from the oil phase and collect them in aqueous phase
- Created a parametric model of a 3-inlet microfluidic channel in AutoCAD. Simulated the mixing of aqueous PVA and PLGA dissolved in acetone by varying flow parameters in Autodesk CFD

Fruit Fly - Biology and Behavior Jun. '21 - Aug. '21

The Leung Lab, University of Saskatchewan Dr. Adelaine Leung

- Investigated the role of mechanosensory neurons present in sex-specific bristle hairs of fly genitalia by analyzing behavioral videos of genetically manipulated flies
- Developed a MATLAB program that can automatically analyze copulation period, making the process faster and error-free
- Worked with JAABA, a machine learning-based behavioral annotator, to understand how to train classifiers for automated analysis of fly behaviors

Genetic Engineering Techniques Jan. '20 - May '20

Lab course, BITS Pilani

- Isolation of plasmid from pQE60 clone of E. coli by boiling lysis, alkaline lysis and kit based methods, restriction-digestion of isolated plasmid and analysis using agarose gel electrophoresis followed by DNA extraction, purification and quantification using Nanodrop
- Performed competent cells preparation of E. coli, transformation using PuC19 vector followed by DNA ligation, creation of recombinant clones and their selection by blue-white screening

Comparative Genomics of the ATR Gene Jan. '21 - May '21

Lab course, BITS Pilani

- Analyzed the ATR gene from various organisms. Wrote python scripts to examine gene content, restriction enzymes sites and start/stop codons. Used GOR4, Predator and Predict Protein to predict and visualize the secondary and 3D protein structures
- Predicted structural and functional regions using GENSCAN and used ORF Finder to obtain the ORFs and protein sequences
- Performed pairwise amd multisequence alignments (EMBOSS, BLAST, Clustal Omega) and phylogenetic tree constructions (MEGA-X) to gain insights into evolutionary and functional relationships and sequence conservation among organisms

Awards and Honors

IPCD Travel Grant Award, BITS Pilani 2022

MCN Scholarship, BITS Pilani 2020