

Pranav C. Patel

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Research Profile

Pharm.D.-trained researcher working across biomedical research, viral genomics, metagenomic surveillance, and pharmaceutical sciences. Experience includes next-generation sequencing data analysis, comparative genomics, phylogenetics, scientific communication, and the development of software to support laboratory data workflows. Interested in interdisciplinary doctoral research combining computational approaches with biomedical questions.

Research Interests

Computational biology; genomics and metagenomics; infectious disease surveillance; viral evolution; translational biomedical science; pharmaceutical drug delivery.

Education

Doctor of Pharmacy (Pharm.D.)

2019–2025

K.B. Institute of Pharmaceutical Education and Research, Kadi Sarva Vishwavidyalaya, Gandhinagar, Gujarat, India

Graduated with distinction.

Research Thesis

To determine association of socioeconomic factors and BMI on visual acuity in school going children.

Research Experience

Project Technical Support–III (Research)

December 2025–Present

Gujarat Biotechnology Research Centre (GBRC), Government of Gujarat, India

- Contribute to viral genomic surveillance and evolutionary genomics through comparative sequence analysis, SNP characterization, and phylogenetic reconstruction.
- Develop and troubleshoot bioinformatics workflows for next-generation sequencing data using Linux, Python, and established computational tools.
- Support wastewater-based SARS-CoV-2 surveillance integrating digital PCR, sequencing, lineage identification, and mutation analysis.
- Analyze shotgun metagenomic data for acute febrile illness and acute encephalitis syndrome surveillance, including quality control, host-read removal, taxonomic classification, and viral detection.
- Prepare sequence alignments for molecular evolution and selection-pressure analyses using HyPhy methods, including FEL, MEME, FUBAR, and BUSTED.
- Contribute to research reporting, data visualization, and scientific outputs for multidisciplinary teams.

Selected Research Projects

AFI–AES Shotgun Metagenomic Surveillance

- Analyze sequencing data for taxonomic classification and viral detection in acute febrile illness and acute encephalitis syndrome surveillance.
- Investigate selected viral detections using reference-based read mapping and genome-coverage analysis.

Wastewater-Based SARS-CoV-2 Genomic Surveillance

- Contribute to genomic surveillance integrating wastewater testing, digital PCR, sequencing, lineage analysis, and investigation of SARS-CoV-2 variant circulation.

Viral Evolutionary Genomics

- Work on viral genome curation, multiple-sequence alignment, SNP analysis, and phylogenetic reconstruction.
- Apply recombination and selection-pressure analysis approaches to investigate viral evolutionary patterns.

Dissolution Enhancement of Poorly Soluble Drugs

- Investigated solid self-microemulsifying drug delivery systems (S-SMEDDS) for macitentan and tolvaptan.
- Evaluated formulations using HPLC, UV spectroscopy, transmission electron microscopy (TEM), X-ray diffraction (XRD), pseudo-ternary phase diagrams, and USP II dissolution testing.

Publications

Peer-Reviewed Journal Articles

1. Gada J, Patel PC, Purohit H, Joshi C, Joshi M, Chavda P, Bagatharia S, Patel A, Prajapati B. Wastewater genomic surveillance identifies the emergence of the SARS-CoV-2 JN.1 lineage in urban settings of Gujarat. *Frontiers in Microbiology*. 2026;17:1791178. [DOI].
2. Patel RR, Patel GD, Kaila ND, et al. Six Sigma Optimized Lipid-based Delivery System for Ibuprofen: Enhanced Solubility, Robust Process Control, and Bioequivalence. *Journal of Pharmaceutical Innovation*. 2025;20:302. [DOI].
3. Patel P, Ramani A, Patel V, Mansuri J, Brahmbhatt J. Association of socioeconomic factors and body mass index on visual acuity in 7–10-year-old children. *Journal of Clinical Ophthalmology and Research*. 2025;13(3):359–364. [DOI].

Book Chapters

1. **Clinical Trials and Case Study Considerations in Myasthenia Gravis.** Elsevier. [DOI].
2. **Role of Natural Products in Treatment of Hepatocellular Carcinoma.** Wiley.

Manuscripts Under Review

1. **PharmaADR-AI: A Pharmacovigilance-Driven Explainable Ensemble Machine Learning Framework for Opioid Adverse Drug Reaction Prediction.** *Journal of Pharmaceutical Innovation*, Springer Nature. Manuscript under review.
2. **Complex Marine Pollutant Mixtures: Ecotoxicological Interactions, Biomagnification, Regulatory Gaps and Future Strategies.** *Current Pollution Reports*, Springer Nature. Manuscript under review.

Research Software, Programming and Bioinformatics Workflows

UMMID Studio: Laboratory Data Automation

- Designed and developed a Windows desktop application using C#, .NET 8, WinUI 3, and MVVM architecture, integrating an existing Python processing backend.
- Implemented PDF report extraction and structured processing of laboratory and patient data, including sample identifiers, collection and report dates, analytical results, normalization, duplicate detection, and Excel integration.
- Worked on application packaging and installer generation to support laboratory workflow use.

RStudio and Statistical Computing

- Develop R scripts for data cleaning, statistical analysis, comparative summaries, and publication-quality visualizations.
- Use dplyr, readxl, ggplot2, and pheatmap for data transformation, Excel input, abundance heatmaps, and visual exploration of sequencing results.
- Prepare sample-level matrices and visualizations for microbial abundance, viral detection, mapping comparisons, and exploratory analyses, including PCA where appropriate.

Python and Sequence Analysis

- Use Python and Biopython for sequence handling, mutation analysis, data manipulation, and automation of repetitive research tasks.
- Develop scripts to summarize nucleotide substitutions and mutation patterns, organize sequence-derived results, and produce structured outputs for downstream analysis.
- Use tabular data-processing workflows to clean, merge, and reshape research datasets for interpretation and visualization.

Linux and NGS Workflow Execution

- Run command-line workflows for paired-end sequencing data, including read quality control, host-read removal, taxonomic classification, metagenomic assembly, gene prediction, and reference-based mapping.
- Manage FASTQ, FASTA, alignment, BAM, and tabular result files; organize reference databases and outputs; and troubleshoot tool execution and workflow issues in Linux environments.
- Perform read mapping and alignment-file processing with Bowtie2, BWA-MEM, minimap2, and Samtools as required by the analysis.

Metagenomics, Viral Detection, and Evolutionary Genomics

- *Read QC and host removal:* fastp and Bowtie2.
- *Taxonomic classification and abundance estimation:* Kraken2 and Bracken.
- *Assembly and gene-level analysis:* MEGAHIT, Prodigal, and DIAMOND, including comparison with antimicrobial resistance gene databases such as SARG.
- *Viral detection and reference mapping:* EsVirtu, BWA-MEM, minimap2, Bowtie2, and Samtools; evaluate mapped reads and genome coverage for selected viral detections.
- *Phylogenetics and molecular evolution:* MAFFT, IQ-TREE, RDP5, and HyPhy, including FEL, MEME, FUBAR, and BUSTED methods for selection-pressure analyses.

Pharmaceutical Research and Experimental Analysis

- Evaluate formulation performance and dissolution using HPLC, UV spectroscopy, TEM, XRD, pseudo-ternary phase diagrams, and USP II dissolution testing.
- Apply statistical analysis and data visualization using R/RStudio and SPSS where appropriate to the research question.

Technical Skills

Bioinformatics and Genomics: NGS data analysis, read quality control, host-read removal, taxonomic classification, metagenomics, comparative genomics, SNP analysis, phylogenetics, recombination analysis, molecular evolution.

Bioinformatics Tools: fastp, Bowtie2, Kraken2, Bracken, MEGAHIT, Prodigal, DIAMOND, Samtools, EsVirtu, BWA-MEM, MAFFT, IQ-TREE, RDP5, HyPhy, iVar, BLAST+.

Programming and Computing: Python, R, Biopython, Linux command line, C#, .NET 8, WinUI 3, SPSS.

Pharmaceutical Research: HPLC, UV spectroscopy, TEM, XRD, pseudo-ternary phase diagrams, USP II dissolution testing.

Scientific Communication: Scientific writing, literature review, manuscript preparation, research reporting, scientific data interpretation.

Additional Professional Experience

Scientific Writer

ClewAce Solutions, India

November 2024–December 2025

- Authored and edited scientific manuscripts across biomedical and pharmaceutical research topics.
- Conducted literature reviews and supported manuscript revision, scientific structure, clarity, and referencing.
- Contributed to the preparation of more than 20 manuscripts through scientific writing and editorial support.

Clinical Trial Operations Trainee

Cliantha Research Ltd., India

July 2024–November 2024

- Supported Phase I bioavailability and bioequivalence study operations and associated documentation.
- Assisted with electronic case report forms (eCRFs), biological sample documentation, and adverse event records.

Clinical Pharmacist Intern

GMERS Medical College, Gandhinagar, Gujarat, India

May 2024–May 2025

- Supported medication reviews and identification of potential drug interactions in clinical practice.
- Prepared two adverse drug reaction reports for the Pharmacovigilance Programme of India (PvPI), applying WHO–UMC causality assessment.

Awards and Honors

- **Youngest Investigator Award**, International Conference on Pharmaceutical and Biomedical Sciences (ICPBS), NIPER Ahmedabad, March 2025. Poster presentation: *A Novel Liposomal Terbinafine Hydrochloride Gel: Insights from a Pilot Clinical Study*.

- **Graduated with Distinction**, Doctor of Pharmacy (Pharm.D.), K.B. Institute of Pharmaceutical Education and Research, Kadi Sarva Vishwavidyalaya.

Research Leadership and Academic Service

Research Volunteer

2023–2025

M. M. Patel Research Cell, Kadi Sarva Vishwavidyalaya, Gujarat, India

- Contributed to research activities, scientific writing workshops, proposal evaluation, academic events, and research documentation.
- Supported coordination and structured feedback on scientific work.

Team Lead, Azadi Ka Amrit Mahotsav Hackathon

2022

Five-member team

- Led development of a concept for a herbal nano-emulsion spray for non-invasive lipoma treatment.

Technical Committee Coordinator, Apocalypse

2021

K.B. Institute of Pharmaceutical Education and Research, Gujarat, India

- Coordinated technical committee activities for an institutional academic event.

Professional Memberships and Certifications

Professional Membership

- Professional Member, European Medical Writers Association (EMWA), 2025–Present.

Certifications and Training

- Scientific Writing in Health Research, Indian Council of Medical Research (ICMR).
- Good Clinical Practice (GCP) training.
- WIPO General Course on Intellectual Property.
- Cardiopulmonary Resuscitation (CPR), Indian Red Cross Society.
- *15 Errors in Scientific Writing and How to Fix Them*, Udemy.