Prathamesh Mandar Chati

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EDUCATION

University of California, San Francisco San Francisco, CA
PhD Candidate; Biological and Medical Informatics (BMI) *September 2023 – Present*

Washington University in St. Louis St. Louis, MO
BA in Chemistry (Biochemistry) and Second-Major in Computer Science | GPA: 3.88 *May 2022*

RESEARCH EXPERIENCE

Washington University School of Medicine | Radiation Oncology | **Lab**: Dr. Aadel Chaudhuri St. Louis, MO
Research Assistant *November 2018 – September 2023*
- Project: Applied machine learning models to query cell type networks in pancreatic ductal adenocarcinoma (PDAC) single-cell RNA sequencing (scRNA-seq) data.
- Results: Showed that a unique community of interacting fibroblast, monocyte, and malignant cell states corresponds to significantly worse overall survival, as does the developmental status of fibroblast states, determined using EcoTyper, CIBERSORTx, CytoTRACE. Developed a random forest model that utilizes PDAC bulk RNA-seq data to risk-stratify patients by cell state signatures, which correlates strongly with survival.
- Specific Contributions: Performed RNA extraction; processed gene expression data; identified significant cell marker genes; developed a modified non-negative matrix factorization (NMF) technique to identify cell state-specific gene signatures; conducted developmental trajectory analysis; trained and cross-validated the random forest and logistic regression models; and conducted Kaplan-Meier and Cox PH regression survival analysis.

Harvard Medical School & Boston Children's Hospital | Gastroenterology | **Lab**: Dr. Jay Thiagarajah Boston, MA
Bioinformatics Research Associate *April 2021 – September 2023*
- Project: Investigated redox-related gene signatures implicated in pediatric ulcerative colitis (UC).
- Results: Determined that genes related to glutathione metabolism, hydrogen peroxide transport, and ROS detoxification correspond with Mayo score, a severity metric for UC.
- Specific Contributions: Collected and processed UC bulk RNA-seq data; used singular value decomposition to extract gene signatures; performed clustering and gene set enrichment to determine broader gene profiles; created and applied a permutation-based gene perturbation test to determine genes implicated in disease state transitions; developed a random forest model and used LOFO feature importances to remove redundant genes; visualized outputs in a custom weighted gene co-expression network; and identified gene trends related to UC severity.

Harvard BCMP Fellow *June 2019 – August 2019*
- Project: Studied progression mechanisms implicated in TTC7A enteropathy – a rare congenital intestinal disease – using organoid models, advanced microscopy, immunohistochemistry, and lineage analysis.
- Results: Showed that TTC7A enteropathy stems from dysregulated actin networks driving the misplacement of proteins that direct epithelial cell polarization, thus, causing abnormal epithelial growth.
- Specific Contributions: Cultured patient-derived intestinal organoids; used z-stack bright-field microscopy to longitudinally analyze organoid growth; designed primers and cultured TTC7A knockdown Caco-2 cells; and performed immunofluorescent staining of junction proteins to determine sources of protein delocalization.

Washington University in St. Louis | Biomedical Engineering | **Lab**: Dr. Jon Silva St. Louis, MO
Research Assistant *October 2019 – May 2022*
- Project: Utilized motion capture technologies and inertial measurement units (IMUs) to develop a motion tracking system for an augmented-reality-based image-guidance system to simplify cardiac catheterization.
- Specific Contributions: Integrated IMU with accelerometer to measure probe movement; developed a program to integrate data from the IMU and accelerometer in C; and created the server-side infrastructure to transfer accelerometer tracking data from the IMU to an augmented-reality headset using JavaScript.

WORK EXPERIENCE

Pillar VC   Boston, MA
Venture Associate   *April 2023 – September 2023*
- Due Diligence: Conducted scientific due diligence on incoming new company deals; evaluated scientific feasibility of emerging research ideas, performed market analysis, and determined optimal therapeutic application of new drug technologies.

Flagship Pioneering, Inc. | FL86   Cambridge, MA
Bioinformatics Research Associate   *March 2022 – March 2023*
- Strategy Research: Conducted drug indicate analysis to understand which diseases best fit product profile; consolidated FDA-approved therapies, disease mechanisms, market saturation, and demographic statistics for 15 kidney-related diseases.
- Genome Meta-Analysis: Created a tool to support generation and analysis of genomic variant data (VCF); used Python and R to collect and process VCF data; and utilized statistical methods to identify target mutations.

Droplet Biosciences, Inc.   Cambridge, MA
Strategy Intern   *June 2021 – September 2021*
- Description: Droplet Biosciences, Inc. is a liquid biopsy startup under The Engine at MIT focused on optimizing post-surgical adjuvant care.
- Strategy Research: Consolidated and analyzed statistics on solid tumor types from CDC USCS, NIH SEER, and ACS NCDB; determined standard of care for certain cancers by interviewing oncologists and using the NCCN guidelines; reviewed literature to determine cancer-specific adjuvant therapies; and generated graphical representations to visualize collected data.

PUBLICATONS

Storrs E., Chati P., Usmani A., … Chaudhuri A. September 2023. *High-dimensional deconstruction of pancreatic ductal adenocarcinoma identifies tumor microenvironmental composition and developmental stemness features associated with survival*. **npj Precision Oncology**. In-Press.

Chati, Prathamesh; Whitaker, Andrew; Silva, Jonathan: *Applications of machine learning for image-guided microsurgery* (Healthcare Technologies, 2022), *Applications of Machine Learning in Digital Healthcare*, Chap. 4, pp. 107-162. **DOI**. **IET Digital Library**.

Storrs E.[1], Usmani A.[1], Chati P.[1], … Chaudhuri A. May 2022. *High-dimensional deconstruction of pancreatic ductal adenocarcinoma identifies tumor microenvironmental communities associated with survival*. **medRxiv**. **DOI**.

PROCEEDINGS & PRESENTATIONS

Erik Storrs, Prathamesh Chati, Abul Usmani, Li Ding, Ryan Fields, Koushik Das, Aadel Chaudhuri; Abstract 1118: High-dimensional deconstruction of pancreatic cancer identifies co-occurring TME features associated with survival. **Cancer Res** 1 April 2023; 83 (7_Supplement): 1118. **DOI**. **Oral Presentation at AACR Annual Conference 2023**.

Storrs E., Usmani A., Chati P., … Chaudhuri A. November 2022. *Deconstruction of pancreatic ductal adenocarcinoma identifies survival-associated tumor microenvironmental communities*. **Cancer Genetics,** Vol. 268, Is. S1. **DOI**. and **CGC Conference 2022**.

Storrs E., Usmani A., Chati P., … Chaudhuri A. June 2022. *High-dimensional analysis to deconstruct pancreatic ductal adenocarcinoma and identify tumor cellular communities with prognostic and potentially predictive value*. **AACR Proceedings,** Vol. 82, Is. 12. **DOI**. and **AACR Annual Conference 2022**.

Chati P.[1], Storrs E.[1], … Chaudhuri A. October 2021. *Derivation of Distinct Prognostic Tumor Cell States in PDAC via Single-Cell RNA Sequencing*. **IJROBP Supplements**, Vol. 111, Is. 3. **DOI**. and **ASTRO Annual Conference 2021**.

Chati P.[1], Storrs E.[1], … Chaudhuri A. July 2021. *Pancreatic ductal adenocarcinoma developmental cell state signatures identified by single cell RNA sequencing are prognostic when applied to bulk RNA-seq data*. **AACR Proceedings,** Vol. 81, Is. 13. **DOI**. and **AACR Annual Conference 2021**.

Chati P.[1], Millet M.[1]. *Digital Health Innovation and Startup Development*. **Oral Presentation** at **Washington University School of Medicine Health Innovation Seminar**; 2021 February; St. Louis, MO.

Chati P.[1], Millet M.[1]. *Introduction to Medical Innovation and Entrepreneurship*. **Oral Presentation** for M1 course at **Washington University School of Medicine in St. Louis**; 2021 January; St. Louis, MO.

Chati P., Storrs E., … Chaudhuri A. *Utilizing Single-Cell RNA-Sequencing and Predictive Machine Learning Frameworks to Prognosticate Pancreatic Cancer Patient Outcomes.* **Poster presentation** at **Washington University Undergraduate Research Symposium**; 2020 December 1-3; St. Louis, MO. **Oral Presentation** at **Midstates Consortium for Math & Science Conference**; 2020 October 31; St. Louis, MO. **DOI**.

Storrs E., Usmani A., Krasnick B., Wetzel C., Hollander T., Chati P., … Chaudhuri A. August 2020. *Time-of-diagnosis prognostication of pancreatic ductal adenocarcinoma based on single cell RNA-seq and digital cytometry.* **AACR Proceedings** Vol. 80, Is. 16. **DOI**. and **AACR Annual Conference 2020**.

Storrs E., Usmani A., Krasnick B., Wetzel C., Hollander T., Chati P., … Chaudhuri A. May 2020. *Single Cell (sc) RNA Seq of Treatment Naive, Endoscopic Ultrasound (EUS) Core Biopsies of Pancreatic Cancer Identifies Unique Tumor Microenvironmental Fractions That Correlate with Prognosis*. **Gastroenterology Supplements,** Vol. 158, Is. 6. **DOI**. and **Digestive Disease Week Conference 2020**.

Chati P., Bugda-Gwilt K., Luong P., Thiagarajah JR. May 2020. *TTC7A Directs Apical Lumen Formation in Intestinal Epithelial Cells.* **Gastroenterology Supplements**, Vol. 158, Is. 6. **DOI**. **Oral presentation** at **Digestive Disease Week Conference**; 2020 May 3; Chicago, IL.

Chati P., Babcock S., Anderson S., … Thiagarajah JR. *Studying the Effects of TTC7A Deficiency & Identifying Novel Congenital Enteropathic Genes*. **Poster presentation** at **Harvard National Collegiate Research Conference**; 2020 January 21-24; Boston, MA.

Chati P., Babcock S., Anderson S., … Thiagarajah JR. *The Effects of TTC7A Deficiency on Epithelial Polarity & Lumen Formation*. **Oral presentation** at **Harvard Medical School BCMP Summer Project Conference**; 2019 August 8; Boston, MA.

Kelley M., Yoshida G., Myers R., Alem K., Chati P., Jora M., Addepalli B., Limbach PA. April 2019. *Fungicide-induced melanin loss causes changes the transfer RNA modification pool in the radiation resistant fungi Cladosporium sphaerospermum*. **The FASEB Journal**, Vol. 33, Is. S1. **DOI**. and **Experimental Biology Conference 2019**.

Chati P., Kelley M., … Limbach PA. *The Impact of Fungicide Induced Melanin Inhibition on tRNA Modifications in Claudio Sphaerospermum.* **Poster presentation** at **University of Cincinnati Department of Chemistry Research Symposium**; 2018 August 1; Cincinnati, OH.

HONORS

Thermo Fisher Scientific Antibody Scholarship (August 2020): Selected as 1 of 6 students nationally for excellence in scientific innovation and research.

Florence Moog Scholarship (May 2020): Half-tuition scholarship awarded to 1 second year WUSTL student for excellence in science and an area beyond.

WUSTL Summer Undergraduate Research Fellowship, **BioSURF** (April 2020): Selected to receive funding to continue computational biology research.

Harvard Medical School BCMP Fellowship (April 2019): Selected as 1 of ~15 students nationally to receive funding for summer research at Harvard Medical School and affiliated institutions.

Kaplan & Fresh Prints Grand Plan Scholarship (March 2019): Selected as 1 of ~10 students nationally for commitment to entrepreneurship and innovation.