

LYLA ATTA

MD-PhD Candidate, Johns Hopkins University

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RESEARCH EXPERIENCE

Graduate Student

JEFworks Lab, Biomedical Engineering, JHU. *Aug. 2020 - present*

Developing statistical and computational tools for the analysis of spatially resolved transcriptomics data.

VeloViz: RNA-velocity informed embeddings for visualizing cellular trajectories.

Bioinformatics, September 2021. Software and tutorials.

Computational challenges and opportunities in spatially resolved transcriptomic data analysis. *Nature Communications*, September 2021

Graduate Rotation Student

Elana Fertig Lab, JHU. *Jul. - Aug. 2019*

Statistical models to simulate immune cell single-cell RNA sequencing.

Research Associate

Scott Manalis Lab, MIT. *Jun. 2017 - Jun. 2018*

Investigated single cell biophysical measurements and gene expression as markers of immune checkpoint inhibitor therapy in melanoma.

Undergraduate Researcher

Douglas Lauffenburger Lab, MIT. *Mar. 2016 - Jun. 2017*

Tested dose dependent effects of drug combinations on TNBC cell lines.

Mathematical growth model comparing TNBC cell line drug response.

Analyzed bulk gene expression to identify mediators of intrinsic resistance to EGFR pathway inhibitors.

Network Analysis of Phosphoproteomic Data in Glioblastoma

Coursework, Statistics and Data Science, MIT. *Fall 2016*

Created graphical models of protein signaling interactions based on receptor tyrosine kinase phosphorylation data from GBM mouse models.

Implemented network analysis approaches to identify differences between tumor and control network models.

Identified significant changes in signaling networks between tumor and control and identified cytoskeletal proteins marking these changes.

Undergraduate Researcher

Ron Weiss Lab, MIT. *Nov. 2014 - Mar. 2016*

Designed an antibody-based extracellular platform for in vivo detection of biomarkers and transduction of an intracellular response.

Collaborated to build detection platform using recombinant gene cloning techniques and tested functionality in Human Embryonic Kidney cells using flow cytometry and confocal microscopy.

Automated, distribution-based clustering of flow cytometry data in Matlab.

TEACHING

Biomedical Engineering, JHU. *Spring 2023, Spring 2024*

Introduction to Data Analysis and Visualization. (Elective, 20 students (2023))

Developed and taught lesson plans, guided independent student projects.

School of Medicine, JHU. *Fall 2022, Fall 2023*

Critical Appraisal of Clinical Studies. (First-year elective 20 students (2022), 30 students (2023))

Developed and taught lesson plans, led student discussion.

Biomedical Engineering, JHU. *Spring 2022*

Genomic Data Visualization. (Elective, 5 students)

Developed and taught guest lecture, graded homework and exams, provided feedback for improvement.

School of Medicine, JHU. *Fall 2020*

Critical appraisal of COVID-19 therapeutics trials. (First-year elective, 15 students)

Developed and taught lesson plans, led student discussion.

Biological Engineering, MIT. *Fall 2016*

Undergraduate core biological engineering course: mechanistic modeling of biomolecular reactions using differential equations in Matlab. (40 students)

Developed and taught lesson plans, created supplementary course notes, problem set and exam solutions.

MENTORSHIP

JEFworks Lab (1 undergraduate and 1 high school student) 2020-2021; Medical School Peer Advisor (2019-2020); Biological Engineering Associate Advisor (2015-2016); Mentor at Saturday Engineering Enrichment and Discovery Academy; Mentor at DynaMIT STEM summer program.

EDUCATION

Johns Hopkins University (JHU)

MD-PhD Candidate *August 2018 - present*

Massachusetts Institute of Technology (MIT)

Bachelors of Science *2013 - 2017*

Major: Biological Engineering

Minor: Statistics and Data Science

ACTIVITIES AND PROJECTS

HEAL Refugee Health and Asylum Collaborative

JHU School of Medicine *Apr. 2021 - Present*

Assisted with and drafted affidavits for 10 forensic physical and psychological evaluations for asylum applicants. Provided Arabic-English interpretation for 2 forensic physical and psychological evaluations for asylum applicants. Translated client orientation documents into Arabic to help Arabic-speaking clients prepare for evaluations.

Open Case Studies

JHU School of Medicine *Nov. 2021 - Mar. 2022*

Contributed to Educators Guide for using Open Case Studies for data science instruction.

JHU Medical School Admissions Committee

JHU School of Medicine *Aug. 2021 - Mar. 2022*

Interviewed 31 JHUSOM applicants, reviewed and summarized applications, and provided admission input to faculty admissions committee.

Greater Boston Pandemic Fabrication Team

panfab.org *Mar. 2020 - Sep. 2021*

Co-led design and testing of Powered Air-Purifying Respirators to address COVID-19 PPE shortages.

Center for RISC

University of Chicago *Jul. 2020 - Sep. 2020*

Adapted data science curriculum for use by students with limited programming experience.

Independent Student Analysis Committee

JHU School of Medicine *Mar. 2020*

Analyzed student survey to identify strengths and areas of improvement in medical school experience for LCME re-accreditation process.

Recommended strategies to improve pre-clinical curriculum, diversity and inclusion, student mistreatment based on student survey results.

Student Curriculum Review Team

JHU School of Medicine *Aug. 2018 - Mar. 2020*

Analyzed evaluations for medical school pre-clinical courses to identify strengths and weaknesses.

Organized student town hall to solicit student feedback to improve pre-clinical Genetics and Metabolism courses.

Designed and analyzed a student survey assessing effectiveness of the Student Curriculum Review Team in facilitating curricular improvements. (Kumar et. al.)

Medical School Peer Advising Leader

JHU School of Medicine *Mar. 2019 - Mar. 2020*

Coordinated matching of 120 first-year medical school students to second-year mentors.

Organized social and educational events facilitating exchange of advice through multiple transitions in medical school pre-clinical curriculum.

Qualified Bilingual Staff Speaker

Johns Hopkins Medicine *Mar. 2020 - present*

Qualified to communicate in Arabic with patients within the scope of clinical student role.

Undergraduate Board President

Biological Engineering, MIT *Feb. 2016 - Mar. 2017*

Established first annual BE Research Symposium for students to present their research.

Planned, administered, and analyzed the first feedback survey and forum soliciting feedback from graduating seniors and presented results to faculty committee.

Led a weeklong Freshman Pre-orientation Program for students interested in biological engineering.

Created a sophomore orientation program for students starting the Biological Engineering major.

PUBLICATIONS

Graduate

- **Atta L.***, Clifton K., Anant M., Fan J., Gene count normalization in single-cell imaging-based spatially resolved transcriptomics. *bioRxiv*, 2023. *under review*.
- **Atta L.***, Sahoo A., Fan J., VeloViz: RNA velocity-informed embeddings for visualizing cellular trajectories. *Bioinformatics*, 2021.
- **Atta L.***, Fan J., Computational challenges in spatially resolved transcriptomics data analysis. *Nature Communications*, 2021.
- Hara T, Chanoch-Myers R, Mathewson ND, Myskiw C, **Atta L.**, Bussema L, Eichhorn SW, Greenwald AC, Kinker GS, Rodman C, Gonzalez Castro LN, Wakimoto H, Rozenblatt-Rosen O, Zhuang X, Fan J, Hunter T, Verma IM, Wucherpennig KW, Regev A, SuvÃ ML, Tirosh I. Interactions between cancer cells and immune cells drive transitions to mesenchymal-like states in glioblastoma. *Cancer Cell*, 2021.
- Miller BF, **Atta L.**, Sahoo A, Huang F, Fan J. Reference-free cell-type deconvolution of pixel-resolution spatially resolved transcriptomics data. *Nature Communications*, 2022.
- Clifton K., Anant M., Aihara G., **Atta L.**, Aimiwu OK., Kebschull JM., Miller MI., Tward D., Fan J., Alignment of spatial transcriptomics data using diffeomorphic metric mapping. *Nature Communications*, 2023. *accepted*.
- dos Santos Peixoto R., Miller BF., Brusko MA., **Atta L.**, Anant M., Atkinson MA., Brusko TM., Wasserfall CH., Fan J. Characterizing cell-type spatial relationships across length scales in spatially resolved omics data. *bioRxiv*, 2023. *under review*.
- Kim JE, Lee RP, Yazigi E, **Atta L.**, Feghali J, Pant A, Jain A, Levitan, Kim E, Patel, Kannapadi N, Shah P, Bibic A, Hou Z, Caplan JM, Gonzalez LF, Huang J, Xu R, Fan J, Tyler B, Brem H, Boussiotis VA, Jantzie L, Robinson S, Koehler RC, Lim M, Tamargo RJ, Jackson CM. Soluble PD-L1 reprograms blood monocytes to prevent cerebral edema and facilitate recovery after ischemic stroke. *Brain Behavior and Immunity*, 2023. *accepted*.

Addressing COVID-19 PPE shortages

- Kothakonda A. *, **Atta L.***, Plana D. *, Ward F. *, Davis C., Cramer A., Moran R., Freake J., Tian E., Mazor O., Gorelik P., Van C., Hansen C., Yang H., Li Y., Sinha M.S., Li J., Yu S.H., LeBoeuf N.R., Linville-Engler B., Sorger P.K. De Novo Powered Air-Purifying Respirator Design and Fabrication for Pandemic Response. *Front. bioeng. biotechnol.*, 2021.
- Antonini M.J., Plana D., Srinivasan S., **Atta L.**, Achanta A., Yang H., Cramer A., Freake J., Sinha M.S., Yu S.H., LeBoeuf N.R., Linville-Engler B., Sorger P.K. A Crisis-Response Framework for Medical Device Development During the COVID-19 Pandemic. *Frontiers in Digital Health.*, 2021.
- Tyan K., Levin A., Avalos-Pacheco A., Plana D., Rand E.A., Yang H., Maliszewski L.E., Chylek L.A., **Atta L.**, Tye M.A., Carmack M.M., Oglesby N.S., Burgin S., Yu S.H., LeBoeuf N.R., Kemp J.M. Considerations for the Selection and Use of Disinfectants Against SARS-CoV-2 in a Healthcare Setting. *Open Forum for Infectious Disease*, 2020.

Medical Education

- Kumar P., Pickering C.M., **Atta L.**, Burns AG, Chu RF, Gracie T, Qin CX, Whang KA, Goldberg HR, Student Curriculum Review Team, 8 Years Later. *Medical Teacher*, 2021.

Undergraduate

- Claas A.M., **Atta L.**, Gordonov S., Meyer A.S., Lauffenburger D.A. Systems Modeling Identifies Divergent Receptor Tyrosine Kinase Reprogramming to MAPK Pathway Inhibition. *Cell. Mol. Bioeng.*, 2018.

PRESENTATIONS AND POSTERS

- Gene count normalization in single-cell imaging-based spatially resolved transcriptomics. *Cold Spring Harbor Labs, Single Cell Analyses Meeting November 2023. Poster*.
- VeloViz: RNA velocity-informed 2D embeddings for visualizing cellular trajectories. *Johns Hopkins Department of Medicine and Whiting School of Engineering Research Retreat February 2023. Poster*.
- Computational Tools for Single Cell and Spatially Resolved Transcriptomics Data Analysis. *Partnering Towards Discovery October 2022. Joint Invited Talk*.
- Understanding transcriptional cell state changes within spatial contexts. *NHGRI Genome TDCC Technology Area Forum May 2022. Invited Talk*.
- VeloViz: RNA velocity-informed 2D embeddings for visualizing cellular trajectories. *Nature Bioengineering Solutions for Biology and Medicine July 2022. Flash-talk and Poster. Best Poster Award*.
- Understanding transcriptional cell state changes within spatial contexts. *NHGRI Genome TDCC Technology Area Forum May 2022. Invited Talk*.
- VeloViz: RNA velocity-informed 2D embeddings for visualizing cellular trajectories. *Neural Information Processing Systems Conference December 2021. Invited Talk*.
- VeloViz: RNA velocity-informed 2D embeddings for visualizing cellular trajectories. *JHU Bioinformatics Symposium October 2021. Flash-talk and Poster*.
- VeloViz: RNA velocity-informed 2D embeddings for visualizing cellular trajectories. *Cold Spring Harbor Labs Single-Cell Meeting November 2021. Flash-talk and Poster*.
- VeloViz: RNA velocity-informed 2D embeddings for visualizing cellular trajectories. *Broad Institute Single-Cell Working Group April 2021. Presentation*.
- VeloViz: RNA velocity-informed 2D embeddings for visualizing cellular trajectories. *Women of Whiting Symposium, Johns Hopkins University, April 2021. Poster*.
- De novo Powered Air-Purifying Respirator Design and Manufacture to Address Commercial Supply Shortages. *Pandemic Response: Resilience and Recovery in the Era of COVID-19, Harvard-MIT Center for Regulatory Science, June 2020. Presentation*.
- Prediction of BET Bromodomain Inhibitor Sensitization to Targeted Cancer Drugs. *Znaty-Merck Prize for Research in BE, May 2017. Presentation*.
- Using Native Transcriptomics to Predict RTK Response to Targeted Cancer Drugs. *Undergraduate BE Research Symposium, May*

2017. Presentation.

- Transcriptome Changes as Mediators of Intrinsic Cancer Drug Resistance. *MIT Amgen Scholars Program*, Aug. 2016. Poster.
- B-Cell Receptor-Based Genetic Sensor for Extracellular Biomarker Detection. *MIT Center for Biomedical Innovations Cell and Gene Therapy Biomanufacturing Summit*, Nov. 2015. Poster.
- Beta-amyloid Detection for Alzheimer's Diagnosis and Therapy. *Institute of Biological Engineering*, Mar. 2015. Presentation.

PROFESSIONAL SERVICE

Peer-review Nucleic Acids Research, 2023. iScience, 2022. Nature Medicine, 2022. Bioinformatics, 2021. Genome Research, 2021. BMJ Open, 2021.

AWARDS

Rachel S. Core Award runner-up for service to the graduate student community.