ALEXANDER FERRENA

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EXPERIENCE

August 2024 – Present
Senior Bioinformatics Programmer, NYU Langone Health
Cardiovascular Research Center
Application and development of bioinformatics methods to analyze high throughput sequencing data: spatial and single-cell transcriptomics, epigenomics, and others.

June 2020 – May 2024
Ph.D. Candidate, Albert Einstein College of Medicine
Lab of Dr. Deyou Zheng (Genetics Dept.) and Dr. Bang Hoang, Orthopedics
Designed and applied analysis workflows for single-cell transcriptomics data from cancer and embryonic development. Developed a pipeline package for scRNA-seq integration and replicate-aware cross-condition comparison.

August 2022 – March 2023
Bioinformatics Consultant, Singulomics Corporation
Developed an efficient, modular analysis pipeline for spatial transcriptomics data.

May 2018 – June 2020
Computational Biology Research Assistant, Memorial Sloan Kettering
Lab of Dr. Tuomas Tammela, Memorial Sloan Kettering Cancer Center
Analyzed high-throughput sequencing data such as scRNA-seq, CITE-seq, and others as a bioinformatician in a dynamic cancer genetics lab.

EDUCATION

August 2019 – May 2024
Ph.D. Candidate, Albert Einstein College of Medicine (AECOM)
Ph.D. in Clinical Investigation, Institute for Clinical and Translational Research
Thesis: *Molecular and Clinical Implications of Skp2 inhibition in Osteosarcoma*

September 2017 – May 2019
M.A. Biotechnology, Columbia University
Department of Biological Sciences, Graduate School of Arts and Sciences
Thesis: *The Impact of Aging on Lung Adenocarcinoma*.

September 2012 – May 2016
B.A. Biology, New York University
College of Arts and Sciences

TECHNICAL SKILLS

Programming: Advanced, daily use of **R** for genomic data analysis and scalable package development, including libraries like Seurat, EdgeR, and InferCNV. Daily use of **Unix shell (bash)**. Experience with **Python** for genomics applications including use of Scanpy, scVelo and Cellrank.

Data analysis: Broad experience in multivariate statistics and machine learning for big data.

Cloud Computing: Extensive use of High-Performance Clusters via the SLURM and Sun Grid schedulers, and experience with AWS.

PUBLICATIONS

March 2024 (In preparation)
scDAPP: a comprehensive single-cell transcriptomics analysis pipeline optimized for cross-group comparisons. In preparation. **Ferrena A**, Zheng XY, Jackson K, Hoang B, Zheng D.

February 2024 (In preparation)
Comprehensive single cell transcriptomics analysis of murine osteosarcoma uncovers Skp2 function in metastasis, genomic instability and immune activation and reveals additional target pathways. In preparation. **Ferrena A**, Zhang R, Wang J, Zheng XY, Zhao H, Schwartz E, Loeb D, Goker B, Borjihan H, Chae S, Yang R, Geller D, Zheng D, Hoang B.

February 2024 (Preprint)
Facilitate integrated analysis of single cell multiomic data by binarizing gene expression values. In review, *Nature Communications*. Posted to *bioRxiv* Feb 2024. Misra R, **Ferrena A**, Zheng D.

February 2024
Targeted inhibition of SCF^{SKP2} confers anti-tumor activities resulting in a survival benefit in osteosarcoma. *Oncogene,* February 2024. Wang J *, **Ferrena A * (co-first author),** Singh S, Zhang R, Viscarret V, Al-Harden W, Aldahamsheh O, Borjihan H, Singla A, Yaguare S, Tingling J, Zi X, Yungtai L, Gorlick R, Schwartz L, Zhao H, Yang R, Geller D, Zheng D, Hoang B.

October 2023
SKP2 knockout in Rb1/p53 deficient mouse models of osteosarcoma induces immune infiltration and drives a transcriptional program with a favorable prognosis.
Molecular Cancer Therapeutics, October 2023. **Ferrena A,** Wang J, Zhang R, Karadal-Ferrena B, Al-Hardan W, Singh W, Borjihan H, Schwartz E, Zhao H, Oktay M, Yang R, Geller D, Hoang B, and Zheng D.

May 2023 (preprint)
Six3 and Six6 jointly regulate the identities and developmental trajectories of multipotent retinal progenitor cells in the mouse retina. In review, *PLOS ONE*. Preprint posted to *bioRxiv* May 2023. **Ferrena A**, Zhang X, Shrestha R, Zheng D, Liu W.

March 2023
Single cell transcriptomics uncovers a non-autonomous Tbx1-dependent genetic program controlling cardiac neural crest cell deployment and progression.
Nature Communications, 2023 March. De Bono C, Liu Y, **Ferrena A**, Valentine A, Zheng D, Morrow B.

October 2022
Systematic comparison of pancreatic ductal adenocarcinoma models identifies a conserved highly plastic basal cell state. *Cancer Research, 2022 October.* Pitter K, Grbovic-Huezo O, Joost S, Singhal A, Blum M, Wu K, Holm M, **Ferrena A**, Bhutkar A, Hudson A, Lecomte N, de Stanchina E, Chaligne R, Iacobuzio-Donahue C, Pe'er D, and Tammela T.

April 2021
The interaction of SKP2 with p27 enhances the progression and stemness of osteosarcoma. *Annals of the New York Academy of Sciences, 2021 April.* Wang J, Aldahamsheh O, **Ferrena A**, Borjihan H, Singla A, Yaguare S, Singh S, Viscarret V, Tingling J, Zi X, Lo Y, Gorlick R, Zheng D, Schwartz EL, Zhao H, Yang R, Geller DS, Hoang B.

FELLOWSHIPS, HONORS, AND AWARDS

May 2020 — **Fellowship Award, PhD program in Clinical Investigation (PCI)**
Applied for and was accepted to this highly competitive fellowship and training program offered to PhD students at Einstein with research proposals focused on biostatistics and clinical research. This program offers advanced, formal biostatistics training with a highly clinical and translational focus.

September 2019 — **Student Spotlight, Columbia Graduate School of Arts and Sciences**
Received distinction for academic and research performance

May 2015 — **Poster Presentation distinction, NYU Undergraduate Research Conference**
Awarded best in group for poster presentation titled *Identification and Characterization of Orthodenticle-Dependent Enhancers.*

LEADERSHIP EXPERIENCE

January 2021 – May 2024 — **Founder and President, Einstein Montefiore Omics Club**
Founded this student organization to facilitate networking, collaboration, and education around -omics technologies. Organized the *Intro to Omics Workshop* series attended by over 150 people to teach bioinformatics data analysis. Led a session on single cell transcriptomics at this workshop.

September 2019 – May 2024 — **Vice-President, Einstein Biotech Club**
Served on the executive board of this club promoting student engagement and education with biotechnology. Led and organized many networking events.

November 2019 – May 2023 — **Elected Councilor, Einstein Diversity and Inclusion (D&I) Council**
Elected to serve on this committee for diversity enhancement by the student body of at Albert Einstein College of Medicine.

September 2017 – May 2019 — **President, Columbia Biotechnology Association (GRO-Biotech CU)**
Served as President of this industry networking group. Helped organize the 2019 Graduate Research Organizations Conference at Columbia with >300 attendees.

TEACHING EXPERIENCE

February 2024 — **Intro to Omics Workshop**, Einstein Montefiore Omics Club
Led a workshop session on scRNA-seq analysis and cell annotation.

September 2017 – December 2017 — **Teaching Assistant, Intro to Genomic Information and Technology**
Worked as a teaching assistant for this genomic data science course taught by Dr. Dimitris Anastassiou at Columbia.

INTERESTS AND HOBBIES

August 2018 – Present — **My Aquarium,** Founder and Chief Executive Fish-Fanatic
A fun and relaxing pastime is to watch the fish and plants in my tropical aquarium.

CONFERENCES

October 2023 — **Musculoskeletal Tumor Society (MSTS), Podium presentation**
Gave a talk at this orthopedic oncology-focused meeting titled "Single-cell transcriptomics of osteosarcoma murine models with SKP2 modulation predicts potent synergistic therapies".

April 2023 — **American Association for Cancer Research (AACR), Poster presentation**
Presented a poster at this cancer-focused conference titled "SKP2 knockout induces macrophage infiltration in p53/Rb1 null transgenic mouse models of osteosarcoma and drives gene expression correlated with improved survival in patients".

December 2022 — **Musculoskeletal Tumor Society (MSTS), Podium presentation**
Gave a talk at this orthopedic oncology-focused meeting titled "SKP2 knockout in Rb1/p53 deficient transgenic mouse models of osteosarcoma improves survival via induction of macrophage infiltration".

September 2022 — **International Society for Limb Salvage (ISOLS), Podium presentation**
Gave a talk at this orthopedic oncology-focused meeting titled "Knockout of SKP2 in pre-clinical transgenic mouse models of OS induces macrophage infiltration and improves survival".

May 2015 — **NYU Undergraduate Research Conference, Poster presentation**
Designed and presented a poster titled "Identification and Characterization of *Orthodenticle*-Dependent Enhancers." Won an award for best poster in the session.

PROFESSIONAL REFERENCES

Dr. Deyou Zheng (Ph.D.), Primary PhD Thesis Advisor
- **Position**: Professor, Departments of Genetics, Neuroscience, and Neurology, Albert Einstein College of Medicine
- **Contact:** https://www.einsteinmed.edu/faculty/10976/deyou-zheng/
- **Relationship**: Dr. Zheng is the primary advisor of my Ph.D. He is an expert in genetics, genomics, and bioinformatics. Deyou has a long track record of leading genomics and transcriptomics studies in a variety of contexts including cancer and development and has mentored many students through the PhD program at Einstein.

Dr. Bang Hoang (M.D.), Secondary PhD Thesis Advisor
- **Position**: Professor, Department of Orthopedic Surgery, Albert Einstein College of Medicine
- **Contact:** https://www.einsteinmed.edu/faculty/14186/bang-hoang/
- **Relationship**: Dr. Hoang is my Ph.D. co-mentor. He is an orthopedic surgeon and expert in patient care for osteosarcoma and other sarcomas along with directing a research lab. He serves as the Chair of the Research Committee for the Musculoskeletal Tumor Society.

Dr. Tuomas Tammela (M.D.,Ph.D.), Masters Thesis Advisor
- **Position**: Associate Member, Cancer Biology and Genetics, Memorial Sloan Kettering Cancer Center
- **Contact:** https://www.mskcc.org/research/ski/labs/tuomas-tammela#people-75
- **Relationship**: Dr. Tammela leads a lab at MSKCC studying cellular heterogeneity in lung and pancreatic cancer. He mentored me through my Masters thesis during my time as a student at Columbia university. Dr. Tammela is a expert in sophisticated genetic modelling and advanced sequencing methods in the study of cancer.