Daniel Brody

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Experience

UCSF Biomedical Sciences, San Francisco CA — Sep 2024 - present
PhD Candidate

- Rotations with Seth Shipman, Joe Bondy-Denomy, and Sukrit Silas
- Engineered bacteriophage to modify commensal and pathogenic bacteria to produce therapeutic peptides

UCSF Oldham Lab, San Francisco CA — Feb 2020 - Aug 2024
Staff Research Associate

- Designed and implemented a custom Split-seq based single nuclei protocol to simultaneously generate RNA-seq data paired with genotyping in order to identify malignant subclones
- Developed a custom biotin pulldown protocol for the recovery of individual combinatorially barcoded libraries from multiplexed samples.
- Developed a standardized workflow for generating and photographing hundreds of serial sections from multiple planes of tumor specimen in preparation for multi scale/multi omic analysis in an effort to deconvolute tumor heterogeneity.
- Developed a custom high throughput (192 concurrent samples) automated workflow for the Opentrons robotics platform, to enable simultaneous extraction of RNA and DNA followed by library preparation for various omic analyses
- Organized and led pilot studies with industry partners
- Optimization and troubleshooting of bead based and column based nucleic acid extraction
- Developed customized protocols utilizing commercial kits for economical high throughput sample preparation using ultra low sample inputs
- Sorted and analyzed samples via flow cytometry
- Wrote python scripts for Opentrons OT-2 Liquid handler to perform extractions, and NGS library preparation
- Optimization of single cell isolation and fixation techniques using ultra low sample input
- Generated figures for publication
- Presented data, experiment proposals, and technology overviews at lab meetings
- Managed laboratory logistics: training, purchasing, lab safety, inventory, project based cost analysis, equipment maintenance and repair
- Mentored and trained a highschool student in molecular biology techniques and analysis over two summers

N-Able Biosciences, Fremont CA July 2015 - Dec 2019
Applications Specialist

- Conducted literature reviews and extensive patent research to elucidate prior art landscape
- Drafted five provisional patents for reagent formulations and diagnostic devices
- Designed customized protocols for improving sensitivity, dynamic range, and incubation times of Western Blot, Direct Eliza, Sandwich ELISA, FISH, and IHC
- Formulated and tested stabilizing reagents for improved antibody storage, extending shelf life by limiting protein aggregation and adsorption to containers
- Developed method of perfusing tissue with non PFA fixative using a transdermal needle array
- Conducted research on source materials for prototype development and negotiated with manufacturers
- Designed and tested prototype incubation chambers for ELISA, microarrays, FISH, and IHC

Cell Scape, Mountain View CA May 2009 - December 2010
Research Assistant

- Utilized a combination of rare blood cell enrichment, fluorescence microscopy and digital imaging techniques to isolate and identify fetal cells in pregnant women's blood
- Processed whole blood to enrich for fetal nucleated red blood cells via leukocyte depletion filters
- Conducted sample fixation, FISH, and microscopic imaging
- Tested slide materials and coatings for improved monolayer formation
- Met with manufacturers to source alternative means of illumination for cell fluorescence

Publications

- Deconstructing Intratumoral Heterogeneity through Multiomic and Multiscale Analysis of Serial Sections. Schupp PG, Shelton SJ, Brody DJ, Eliscu R, Johnson BE, Mazor T, Kelley KW, Potts MB, McDermott MW, Huang EJ, Lim DA, Pieper RO, Berger MS, Costello JF, Phillips JJ, Oldham MC. Cancers 2024, 16(13), 2429; https://doi.org/10.3390/cancers16132429

- Low cost automation of DNA/RNA co-extraction, RNA-seq, and Exome-seq library preparation on the Opentrons OT-2 liquid handler. Brody DJ, Schupp PG, Oldham MC. (In Preparation)

- Simultaneous Single Nucleus Transcriptional Profiling and Genotyping of Malignant Subclones via Modified Split-seq Protocol. Brody DJ, Schupp PG, Oldham MC. (In Preparation)

Education

Harvard Extension School, Cambridge MA August 2013 - May 2015
Health Careers Program

- Biomedical device development
- Learned laboratory techniques such as:
    - PCR, mass spectrometry, development of transgenic zebrafish, chemical synthesis, liquid chromatography, H&E staining

Whittier College, Whittier CA September 2011 - January 2013

BA, Psychology, Neuroscience emphasis

- Senior Project: A method for exploring the relationship between hypoxic insult and neurodegenerative disease.
    - Developed a strategy to evaluate the efficacy of using hypoxia as a model for neurodegenerative disease, employed publicly available gene expression data to cross reference genes up-regulated or down-regulated in response to hypoxic insult, with gene regulation in parkinson's and alzheimer's disease. In this approach data is used to create a reverse test that evaluates the extent to which hypoxia could recapitulate gene expression associated with ND.

Skills

Lab:

- NGS library prep
    - RNA, Exome, Methylome, Amplicon, Single Nucleus (Parse, 10x)
- High throughput liquid handling automation
- Fluorescence microscopy, Flow cytometry, Immunoassay development
- Cell and tissue fixation, Fresh frozen and paraffin embedded sectioning and IHC

Software:

- Python, R, Arduino, FlowJo
- OnShape Cad and G-Code CNC programing, Adobe Illustrator, Photoshop, Image J,

Projects

96 well plate magnet:

I designed and assembled a simple tool for removing magnetic beads from 96 wells simultaneously without having to use a pipette. The tool is assembled by drilling out the well bottoms of 96 well PCR plate, dropping in magnetic ball bearings that then protrude from the holes, and finally using a heat gun to set the ball bearings. Once assembled you can place the tool into a clean plate and submerge the bottom of the clean plate into the solution from which magnetic beads are to be removed. This tool can be used to perform bead washes, but is most useful in removing beads after a final elution.

Erythrocyte fragility diagnostic device:

I designed and built a small, inexpensive, single wavelength spectrophotometer that quantifies erythrocyte fragility, utilizing little more than an LED, photodiode, microcontroller and lysis buffer. The device measures the rate at which cells lyse in multiple concentrations of lysis buffer. Cells exhibiting spherocytosis lyse more quickly than normal erythrocytes whereas sickle cell lyse less readily.
An immediate and obvious application of the device would be as a screening diagnostic in developing countries for blood disorders, such as thalassemia, spherocytosis, and sickle cell anemia.
The chemistry and process could be further adapted to develop a technique for measuring mechanical fragility, which has implications for blood storage, transfusions, and dialysis.

Algal growth tracking: The device described above has been modified to monitor algal growth in a bioreactor

Un-SEQ Journal Club:

Founded a UCSF based journal club called Un-SEQ (Unqualified Scientists Engage Questioningly), dedicated to exploring research beyond the members' areas of expertise, with an overarching theme of 'Science vs Scientism'.

Other Experience

Private Tutor, California & Massachusetts — September 2010 - May 2016

- Specialized in working with students with learning disabilities
- Coached students to develop writing skills and efficient study habits
- Lead test preparation and study sessions

East Los Angeles Regional Care, Whittier CA — April 2012 - May 2013

Respite Care Provider

- Provided intermittent respite care for an autistic individual

American Red Cross, Whittier CA — January 2012 - December 2012

Administrative Assistant

- Assembled an instruction manual to guide student workers and volunteers through class registration, data entry, and class management

Whittier/ DeAnza Cross Country and Track Team Captain:

My teams surpassed all expectations. I attribute our success to the culture we built: competitive yet collaborative, demanding yet jocular, with all members valued.

Awards and Honors

- John Greenleaf Merit Scholarship — *2011, 2012*
- American Red Cross Volunteer of the Month — July *2012*
- Distinguished Student Athlete Award — *2010, 2011, 2012*
- Cross Country Team Captain — *2010, 2012*
- Dean's List — *2009, 2010, 2012*