Jacob Fischman

*Curriculum Vitae*

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**OBJECTIVE**

To pursue biomedical studies at the graduate level so that I may expand upon my work in immunotherapy, and enhance my skills and knowledge of cell engineering and synthetic biology. My long-term interests include the development of methods, tools, and engineering platforms for enhancing the efficacy and breadth of cellular therapies for novel indications. I plan to further develop the field of immunotherapy by exploring untapped and intersectional regions of synthetic biology.

**EDUCATION**

**South Brunswick High School** August 2012 – June 2016

High School Diploma

**Muhlenberg College** August 2016 - May 2020

Bachelor of Science, Biochemistry, *cum Laude* Overall GPA: 3.62/4.00

Focus: Immunology Major GPA: 3.57/4.00

**Perelman School of Medicine at the University of Pennsylvania** August 2023 – Present

PhD, Immunology GPA: 4.00/4.00

**RESEARCH AND WORK EXPERIENCE**

**Perelman School of Medicine at the University of Pennsylvania** August 2023 – Present

* Completed coursework in graduate level Molecular Genetics, Cell Biology and Immunology courses. Earned 4 As and 3 A+s in first year courses.
* Completed three rotations under the mentorship of Evan Weber, PhD, Christoph Ellebrecht, MD and James L Riley, PhD.
* Riley Lab –Currently exploring Treg biology and applications of CAR Tregs.
* Ellebrecht Lab –Cloned ~200 vectors for in vivo CRISPR screen applications and xenium imaging. Developed in house software for high-throughput sequence and barcode validation.
* Weber Lab **–** Developed novel systems for combinatorial protein engineering.

**Memorial Sloan Kettering Cancer Center** May 2020 – Present

*van den Brink Lab Senior Research Technician*

***Research***

* Develop novel CAR-T therapies against AML, DL-BCL, Myeloma and B-ALL in syngeneic murine leukemia models.
* Engineer and leverage multi-vector sorting systems for use in immunotherapy applications.
* Maintain mouse colonies, and perform animal husbandry and *in vivo* experimentation for 4 post-doctoral researchers and 1 graduate student.
* Consult with senior postdoctoral researcher on transgene design, and construct engineering by leveraging literature searches and *in silico* modeling of protein structures.
* Deploy research systems for exploring the efficacy of immunotherapeutics.
* Prospective authorship on 5 unpublished manuscripts involving novel syngeneic studies of CAR-T therapies for contributions of construct production, *in vitro* experimentation, i*n vivo* experimentation, platform development, experimental design, and scientific discourse.

***Leadership and Training***

* Promoted to Senior Research Technician in May 2022.
* Trained 2 research technicians, 2 postdoctoral researchers, 1 rotation student and 1 intern on the concepts of cloning, construct design, viral vector production, and the research scope and workflows of the CAR-T team.
* Trained my team of research technicians in protocol management, lab organization and institutional policies.
* Supervise CAR-T research technicians in the development of over 300 novel DNA constructs per annum and maintenance of up to 20 active *in vivo* experiments.

***Management***

* Maintain Laboratory protocols (IACUC and IBC) to remain compliant with regulatory oversight and research scope for over 45 team members.
* Performed capital requisition in excess of $500,000 during the 2021 fiscal year.
* Manage my team of six research technicians in maintaining our lab and producing high-quality science
* Conduct preliminary interviews for research technician candidates with an emphasis on screening for subject competency, motivation, and relevant skills.
* Streamline correspondence with vendors and external organizations to promote the uninterrupted flow of necessary supplies.

***Independent Work***

* Developing master transcription factor regulators for ameliorating toxicity and promoting long-term progression-free survival and T cell persistence in syngeneic murine leukemia models.
* Constructed novel software for tracking *in vivo* experimentation and automated production of Kaplan-Meier Curves.
* Designed and deployed a mouse reperfusion device to reduce workflow duration for large organ harvests.

**Freelance 3D CAD Modeling** Winter 2021

* Constructed production quality models for retail and advertising applications on Amazon web stores.

**Tutoring – Self-Employed – Mentorship Tutoring** August 2020 – Present

* Developed customized learning programs for 20+ students to promote understanding of complex topics and integration of multimodal information.
* Coach students in comprehension of academic material, development of constructive study habits, and adoption of effective learning strategies.
* Subjects tutored: Biochemistry, Immunology, Organic Chemistry I & II, General Chemistry I & II, AP Biology, High School Honors Chemistry, High School Honors Physics.

**Cuadra Lab – Muhlenberg College** Fall 2018 – Spring 2020

*Undergraduate Research Independent Study*

* Explored host bacteria interactions in the oral microbiome.
* Formally presented findings to members of the lab during bi-weekly lab meetings.
* Developed protocols and experimental methodology for assaying the effects of E-liquid

on commensal bacteria.

* Characterized the effects of E-Liquid and E-Cigarette by-products on oral epithelia and

commensal early colonizers.

* Authored manuscript and published on the effects of E-Liquid flavors on oral commensal

bacteria.

**Infectious Disease Internship** May 2019 – August 2019

*Regeneron Pharmaceuticals Infectious Disease Bacteria Group* *Summer Internship*

* Identified and in vitro validated therapeutic targets against *Borrelia burgdorferi.*
* Cloned and developed novel genetic sequences using Overlap-Extension PCR.
* Developed methods for *B. burgdorferi* outer membrane protein expression in heterologous systems.
* Characterized and cultivated model *B. burgdorferi* strains for use in the rapid prototyping of therapeutic antibodies.
* Formally presented findings to my team of 7 and a department of 50 scientists.

**Inflammation and Immunity Internship** May 2018 – August 2018

*Regeneron Pharmaceuticals I&I Department* *Summer Internship*

* Characterized the role of Plasmacytoid Dendritic Cells (pDCs) in SLE.
* Developed and performed ELISA assays to explore cytokine production.
* Explored the role of Vitamin D as a tolerizing agent in murine models.
* Explored the therapeutic efficacy of M2 and total macrophage depletion in the treatment

of lung and cardiac fibrosis.

* Assisted in mouse harvests and tissue processing of lymphoid organs.
* Formally presented findings to my team of 8 investigators.
* Performed literature review of the biology of pDCs and their role in SLE pathogenesis.
* Compiled findings into an informative presentation for executives and new team members.

**Rheology of Rod-Like Micelles - Muhlenberg College** Fall 2017

*Undergraduate Research* *Independent Study*

* Explored the relaxation of potassium oleate-menthol suspensions after the application of shearing forces.
* Employed Rheoplus software suite in the analysis of relaxation times and fluid dynamics of potassium oleate-menthol suspensions.
* Developed critical analysis and research skills, including notebook maintenance, data

analysis, and scientific reporting.

**Robotics and Flight Science Instructor** Summer 2016 and 2017

*Steamworks Studio Summer Camp Instructor*

* Organized and instructed Vex Robotics Platform for students between 7-15 years old.
* Developed curriculum for engineering classes on aviation and robotics.
* Instructed classes on robotics and engineering.
* Instructed classes on avionics and mechanics of flight.

**PUBLICATIONS**

* Brandon D Ng, Adhithi Rajagopalan, Anastasia I Kousa, **Jacob S Fischman**, Sophia Chen, Alyssa Rae Massa, Harold K Elias, Dylan Manuele, Michael Galiano, Andri L Lemarquis, Alexander P Boardman, Susan DeWolf, Jonah Addison Pierce, Bjarne Bogen, Scott E James, Marcel R.M. van den Brink; IL-18-secreting multi-antigen targeting CAR T-cells eliminate antigen-low myeloma in an immunocompetent mouse model. Blood 2024; *blood*.2023022293. doi: https://doi.org/10.1182/blood.2023022293
* **Fischman, J. S**., Sista, S., Lee, D., Cuadra, G. A. & Palazzolo, D. L. Flavorless vs.

Flavored Electronic Cigarette-Generated Aerosol and E-Liquid on the Growth of Common Oral Commensal Streptococci. *Front. Physiol.* **11**, 585416 (2020).

**PRESENTATIONS**

* High-Throughput Validation of Barcoded Vectors Enabled by “Xpress Checkout”. Philadelphia, PA, June 2024, Dermatology Department, PowerPoint Presentation.
* Evaluating Therapeutic Potential of BamA Against Lyme Disease Agent *Borrelia*

*burgdorferi*. Tarrytown, NY, August 2019, ID department presentation, PowerPoint Presentation.

* Exploration of the role of pDCs and Type 1 Interferons in Systemic Lupus Erythematosus

Pathogenesis. Tarrytown, NY, August 2018, I&I department presentation, PowerPoint Presentation.

**LEADERSHIP EXPERIENCE**

**Instructional Assistant – Muhlenberg College** Fall 2019

*General Chemistry Lab* *Reported to Dr. Silvia Porello*

* Assisted lab instructor in guiding students through General Chemistry Lab exercises.
* Guided students through critical thinking, and increased material comprehension to

promote improved learning outcomes.

* Enforced safe laboratory practices.

**Director of Academic Affairs – Delta Tau Delta Fraternity** Spring 2019 – Spring 2020

* Promoted good academic standing among the fraternity through academic consulting.
* Implemented strategic planning meetings with at-risk members to explore and develop

effective study plans to maintain sufficient grades.

* Worked with members of the fraternity and the Muhlenberg Career center to develop

long-term goals and career plans for interested members.

**Student Ambassador – Muhlenberg College** Fall 2017 – Fall 2019

* Introduced prospective students to academic and social life at Muhlenberg College.
* Evaluated applicants for admittance to Muhlenberg College.

**Peer Tutor – Muhlenberg College** Fall 2017 – Spring 2019

*Muhlenberg Tutoring Center*

* Tutored students in Introductory Biology, General Chemistry, Biochemistry, Organic Chemistry, and Psychology courses.
* Worked with students one on one and in group settings to promote understanding of

course material.

**Robotics Team Captain** Fall 2013 – Fall 2015

*South Brunswick High School Team 750 W*

* Coached my team of 16 individuals in the development of competition-winning robots.
* Maximized team synergy by organizing group hackathons and promoting cross-team communication.

**SKILLS**

**Transferable Skills**

* Critical Thinking – Literature analysis and review. Protocol development and data

interpretation. Experimental design and execution.

* Teamwork and Management– Coordinate my team of research technicians to ensure production goals are consistently met or exceeded.
* IT Expertise – Proficient understanding of computer systems and electronics. IT consultant for my lab of 45+ investigators.

**General Lab**

* Aseptic Technique – Equipped to maintain an uncompromised lab environment.
* Light Microscopy – Observation and quantification of lymphocytes and whole blood.
* Autoclave Operation – Sterilization of media and tools.

**Mouse Handling and *in vivo* Experimentation**

* Scuffing, weighing, and tagging experimental specimens.
* Organ Harvest – Removal and processing of bone marrow and lymphoid organs.
* Bioluminescent Imaging (BLI) – Observation and understanding of BLI and applications in the validation of therapeutic efficacy. Integration of two color BLI.
* Diagnosis of GvHD, CRS, metastasis, and morbidity in mice.
* Breeding – Maintenance of congenic Balb/c ly5.1 mouse colony.
* Genotyping – Validation of knockout phenotypes via PCR and gel electrophoresis.

**Molecular Biology**

* Viral Vector and Transgene Design – Assist in the design of viral vectors and recombinant

proteins for use in immunotherapy applications.

* Restriction Enzyme Cloning – Digestion, amplification, and propagation of DNA.
* PCR, OE-PCR, qPCR – Design of primers, overlap primers, PCR protocols,

thermocycler operation, and diagnosis of amplification failure modes.

* DNA-Prep and Purification – Column mediated ethanol precipitation methods.
* Sanger Sequencing – Development of sequencing protocols and sequence validation.
* ELISA and Bead Array – Perform high throughput multiplexed ELISA.

**Cell Biology**

* T Cell Stimulation - Preparation of T cells for viral transduction.
* Cell Isolation **–** Positive and negative selection using MACs columns.
* Cell Culture – Culturing of modified HEK293T cells for the production of retroviral particles. Culturing of splenic T cells for viral transduction and functional assessment.
* Retroviral Transduction – Use of engineered viruses for stable integration of

transgenes in mouse T cells.

* Flow Cytometry – Validation of exhaustion phenotypes and viral transduction.

**Computer Skills**

* Snapgene – Engineering and reverse engineering of viral vectors and plasmids.
* FacsDiva – Acquisition of flow cytometry data.
* FlowJo – Preparation and analysis of flow cytometry data.
* Onshape and Fusion 360 – 3D modeling of devices and products.
* NCBI BLAST and Uniprot – Applications of gene and protein homology to inform experimental designs and understand data.
* ELN (Electronic Lab Notebook) – Documentation of lab protocols and experimental

records with an emphasis on file system organization, data integrity, and readability.

* UCSF Chimera – Protein modeling and analysis of enzymes and small peptides. Experience in molecular docking and conformational analysis.
* Graph Pad/Prism – Competent in figure production and data analysis.
* Microsoft Office – Proficient in the use of MS Office for the compilation and

presentation of data, as well as the development of spreadsheet-based applications for data analysis.

**Other Skills**

* Mechanical Engineering – Development and construction of competition-ready, award-winning robots.
* Web Development – Production of a website for the van den Brink Lab.

RELEVANT COURSEWORK

**Immunology**

* Explored the immune system through biochemical, cellular, and physiological lenses, with a focus on the integration of all aspects of immunity and inflammation in the context of disease states.
* Developed an understanding of the language of immunology to navigate the primary literature effectively.
* Completed five literature review papers, analyzing high-impact publications ranging from topics on autoimmune disease to allograft rejection and M2 polarization in fibrosis.

**Medicinal Chemistry**

* Developed an understanding of pharmacokinetics/pharmacodynamics and the interplay between drug development and metabolism.
* Produced a review paper: *Highly Selective Small Molecule Immunoproteasome Inhibitor.*
* Presented a lecture: *Small Molecule Immunoproteasome Inhibitors and Their Role in Preventing Heart Allograft Rejection*.

**Experimental Biochemistry**

* Developed skills in navigating literature and breaking down high-impact papers to derive the motivations of the authors and critique data-driven conclusions.
* Presented a lecture-style literature review on the publication: *Structure of Plasmodium falciparum Rh5-CyRPA-Ripr invasion complex.*
* Conducted a semester-long project characterizing *S. lincolnensis* L-DOPA dioxygenase,

with a focus on protein expression, purification, validation, and kinetics-based assays.

**Advanced Biochemistry**

* Explored biochemistry, with a focus on mammalian and mammalian-microbiota metabolism. Emphasis on predicting enzymatic mechanisms, understanding enzymatic and compartmental regulation, and understanding biology as the manifestation of macromolecule function.
* Produced a review article analyzing the publication: *Multi-omics analysis of multiple missions to space reveal a theme of lipid dysregulation in mouse liver,* where I communicated high-impact biochemistry literature to the lay community.
* Conducted a semester-long undergraduate web-enabled thesis project exploring the biochemistry of *Mycobacterium tuberculosis* and mechanisms through which latency and reactivation are mediated.

EXTRACURRICULARS

**Delta Tau Delta Fraternity** Spring 2018 – Spring 2020

*Muhlenberg College*

* Organized efforts to raise funding for the Juvenile Diabetes Research Foundation.
* Organized a pledge class project to generate charitable donations via the production of a school-wide fair.

**Chemistry Club** Fall 2016 – Fall 2020

*Muhlenberg College*

* Organization of educational and exploratory events and recruitment of new members.
* Organization of science seminars.

**Intramural Volleyball** Fall 2018 – Fall 2019

*Muhlenberg College*

* Participated in weekly intramural volleyball.

**Robotics Club** Fall 2012 – Spring 2016

Head of Engineering and Design on Team 750W Fall 2015 – Spring 2016

* Designed and manufactured several competition robots.

Robotics Team Captain Fall 2013 – Fall 2015

HONORS AND ACHIEVEMENTS

**Keith M. Keenly Microbiology Award** 2020

* Awarded for demonstration of outstanding achievement, interest, and potential in the field of microbiology.

**SBHS Robotics Most Valuable Player** 2016

* Awarded by the program coordinator for dedication to and development of the SBHS robotics program.

**Vex Robotics State Championship** 2015 – 2016

* New Jersey state champion.
* Qualification for the international tournament.

**Vex Innovate Award** 2015

* Awarded for the development and application of a ratcheting flywheel mechanism designed to reduce motor strain and reliance on PID control algorithm.

HOBBIES AND INTERESTS

**Hobbies**

* Freelance web design, Freelance CAD modeling, Painting, Cooking

**Interests**

* Academic – Biochemistry, Immunology, Organic Chemistry, Philosophy, Psychology
* Personal – Pop Culture, Science Fiction, Jurassic Park Pop Culture, Isaac Asimov