UCSF Benioff Children's Hospital
Oakland

UNLOCKING THE POTENTIAL WITHIN TOMORROW'S STEM LEADERS

43rd Annual

SUMMER STUDENT RESEARCH PROGRAM SYMPOSIUM

Friday, August 2, 2024
12:00-5:00 pm
MLK Research Building

What's behind the creation of this year's theme

Artificial intelligence & machine learning (AI/ML) has begun to transform the landscape of clinical and biomedical research. In clinical research, AI/ML algorithms will revolutionize patient diagnosis and treatment by enabling the analysis of vast amounts of electronic health records, medical images, and genomic information. These algorithms can identify patterns and predict outcomes with remarkable precision, facilitating early detection of disease and personalized treatment plans. AI/ML will also streamline clinical trials by optimizing patient selection, monitoring adherence, and predicting potential outcomes, thereby reducing costs and time to market for new therapies. In biomedical research, AI/ML can rapidly analyze complex biological data, identify potential drug candidates, and predict their interactions and effects, which traditionally required extensive laboratory work and time. The ability of AI/ML to integrate and analyze diverse datasets from genomics, proteomics, and other technologies pave the way for breakthroughs in personalized medicine and precision healthcare. UCSF is positioned to be a leader in AI/ML clinical and biomedical research.

This year, we leaned into the AI/ML revolution by focusing on new technologies and exploring some of the next-gen tools which will become available for our students as they start their careers. In fact, ChatGPT recommended this theme and wrote this reflection, with the final touches from some lovely humans.

UCSF Benioff Children's Hospital Oakland

August 2, 2024

Welcome to the 43rd Annual UCSF Summer Student Research Symposium (SSRP)!

Over 4 decades ago we hosted our first group of summer research interns, since then the program has quadrupled in size, expanded to multiple UCSF campuses and now includes high school students. What hasn't changed is our mission. Our goal remains focused on providing a short-term experience in state-of-the-art biomedical research designed to encourage students to enter and persist in careers within scientific research. This allows us to confront the disparities of representation within science employment and academic programs.

As the academic landscape continues to be more competitive, and students recover from the challenges faced, and disparities imposed during the covid pandemic years, many have sought summer internships, additional coursework and volunteer experiences to fill the gap. Not surprisingly, we had the largest number of students apply to SSRP this year, nearly twice the number of applicants compared to past years. The 36 students selected to participate in the program this year embody not only the beauty of diversity and the joy of creativity, but also represent hope for the future in biomedical research.

Despite their diverse backgrounds, all these trainees have one common goal - they are considering careers in biomedical research and other health care fields. These end of summer oral and poster presentations constitute the conclusion of a nine-week long program that has featured a rigorous mentored guided research project and education curriculum. Students asked important basic, clinical and public health research questions, considered ethical dilemmas and struggled with obtuse medical terminology. Today, we invite you to learn about the original research projects that our trainees were involved in. Please mingle and chat with the students, as well as the research scientists and physicians who served as mentors for the trainees. We feel truly privileged and honored to have the trainees in our organization and hope that their summer research experience offered a brief glimpse into the exciting world of biomedical research. Most importantly, thanks to all of the SSRP mentors and supervisors who are the backbone of the program. We appreciate their time, effort, and profound commitment to mentor these students.

A very special note of appreciation also goes out to: David Killilea, Roialle Luckett, and Lisa Romero, the core of our leadership team who worked tirelessly since December to put together this stellar program. We would also like to thank Holly Duden, Jennifer Joe, Tanya Shunney, Raquel Manzo and all the guest seminar speakers and other friends of SSRP for their time and expertise which made this summer's program a huge success. We acknowledge the generous funding support provided by the NIH, DDF, CIRM, ACHPP, the Bert Lubin Scholarship Fund and the Bakar Foundation.

We wish the trainees all the very best in their future scientific endeavors; please keep in touch as we are always anxious to hear what our alumni are up to!

Sincerely,

Ellen B Fung

Ellen Fung, PhD RD
Co-Director, SSRP
Adjunct Professor
Division of Hematology, Dept Pediatrics, UCSF

Marsha Treadwell

Marsha Treadwell, PhD
Co-Director, SSRP
Professor
Division of Hematology, Dept Pediatrics, UCSF

UCSF Benioff Children's Hospital Oakland

Table of Contents

Support for the 2024 Summer Student Research Program was generously funded by the following programs and foundations

National Institutes of Health

STIMULUS:
Science & Technology IMmersion for Underrepresented Learners in the US
R25 HL125451
Co-PI: Fung EB, Treadwell M

California Institute for Regenerative Medicine

SUSTAIN-A-SPARK: Supporting Underrepresented STEM Adapting to Change: Summer Program to Accelerate Regenerative Medicine Knowledge
EDUC3-13114
Co-PI Fung EB, Killilea D

Doris Duke Charitable Foundation

SUSTAIN
SSRP Supporting Underrepresented STEM Adapting to Change
#2023-0361
Co-PI: Fung EB, Treadwell M

The Bertram Lubin Scholarship Fund

Various Anonymous Donors

Program Advisory Committee Members

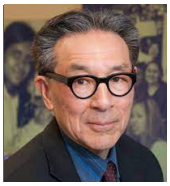
Frank Bayliss, PhD
Professor
Director, Student Enrichment Opportunities Office
San Francisco State University

Gino Galvez, PhD
External Evaluator, SSRP
Director, Center for Evaluation and Educational Effectiveness (CEEE)
Associate Professor, Department of Psychology
California State University, Long Beach

Maria Garcia, MD, MPH, MAS
Assistant Professor
University of California, San Francisco

Jocelyn Freeman Garrick, MS MD
Deputy Medical Director, Alameda County EMS
Executive Director, ACHPP

Caroline Hastings, MD
Director, Fellowship Program
Hematologist/Oncologist
UCSF Benioff Children's Hospital, Oakland



John Matsui, PhD
Director, Co-Founder, Biology Scholars Program
Assistant Dean, Biological Sciences
University of California, Berkeley

Vasanthy Narayanaswami, PhD FAHA
Professor of Biochemistry
Program Director, MARC U*STAR
California State University Long Beach

Seti Sidharta, PhD
Director, Center for Science Excellence Program
Contra Costa College

Program Leadership Team

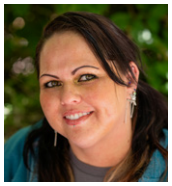
Ellen Fung, PhD RD CCD
Adjunct Professor, Division of Hematology, UCSF
Co-Director, SSRP
UCSF Benioff Children's Hospital Oakland

Marsha Treadwell, PhD
Professor, Division of Hematology, UCSF
Co-Director, SSRP
UCSF Benioff Children's Hospital Oakland

David Killilea, PhD
MLK Core Laboratory Manager, UCSF
Program Manager, SSRP
BCH-Oakland SSRP Site Co-I

Roialle Jennings
Program Coordinator, SSRP
UCSF Benioff Children's Hospital Oakland

Lisa Romero
Data Analyst, Student Liaison, SSRP
UCSF Benioff Children's Hospital Oakland



Holly Duden
Program Assistant, SSRP
UCSF Benioff Children's Hospital Oakland

Aaron Streets, PhD
Associate Professor
Department of BioEngineering, UC Berkeley
UCB SSRP Site Co-I

Kala Mehta, PhD
Associate Professor
Department Biostatistics & Epidemiology, UCSF
UCSF SSRP Site Co-I

SSRP 2024 Selection Committees

Undergraduate, March 6, 10:00 – 12:00 pm

David Killilea, PhD
Manager, Research Resource Program, UCSF
Program Manager, Summer Student Research Program

Ellen Fung, PhD RD
Adjunct Professor, UCSF
Co-Director, Summer Student Research Program

Kathleen Schultz, MSc
Staff Research Associate II, Research Resource Program
University of California, San Francisco

Marsha Treadwell, PhD
Professor, UCSF
Jordan Fund Endowed Chair
Co-Director, Summer Student Research Program

Amber Peake
SSRP Alumni

Steve Mack, PhD
Adjunct Professor, UCSF

Karen Daley, MA, LMFT
Founder, Many Rivers Healing

Prachi Singh, DO
Director, Antimicrobial Stewardship Program
Infectious Disease, UCSF

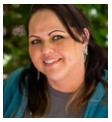
Mai Baalbaki, PhD
Berkeley Free Clinic

Erin Rosales
SSRP Alumni

Eric Garcia
SSRP Alumni

Lisa Romero
Data Analyst, Student Liaison
UCSF Summer Student Research Program

Elijah Goldberg
SSRP Alumni

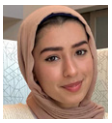


Holly Duden
Program Assistant, SSRP
UCSF Benioff Children's Hospital Oakland

High School, March 8, 10:00-12:00 pm

David Killilea, PhD
Manager, Research Resource Program, UCSF
Program Manager, Summer Student Research Program

Ellen Fung, PhD RD
Adjunct Professor, UCSF
Co-Director, Summer Student Research Program



Sameeha Salmon
SSRP Alumni

Charles Anthony Woodfork
SSRP Alumni

Bonny Alvarenga
SSRP Alumni

Christine McDonald, ScD
Associate Professor, UCSF
Director of the International Zinc Nutrition Consultative Group

Robert Ward Hagar, MD
Professor, Hematology
Department of Pediatrics, UCSF

Sarah King, PhD
Research Laboratory Supervisor
University of California, San Francisco

Sandra Larkin
Staff Research Associate
University of California, San Francisco

Lisa Romero
Data Analyst, Student Liaison
Summer Student Research Program, UCSF

Michelle Ednacott, MS
Program Manager, CHAMPS
UCSF Benioff Children's Hospital Oakland

Angel-Max Guerrero, MA
Pipeline Program Manager
University of California, San Francisco

Lisa Calvelli
Retired Coordinator, Bone Density Clinic
UCSF Benioff Children's Hospital Oakland

Kathleen Schultz
Staff Research Associate II, Research Resource Program
University California, San Francisco

Summer Student Research Program Curriculum

UCSF Summer Student Research Program Curriculum

Program Objectives:

- *Develop a basic understanding of research design and methodology*
- *Learn to read and critically evaluate scientific literature*
- *Present scientific topics effectively and succinctly*
- *Develop a professional relationship with a scientific mentor*
- *Create a detailed scientific proposal under the guidance of your mentor*
- *Connect with other like-minded and motivated students*
- *Gain a deeper understanding of careers in the biomedical sciences*

Overview

The curriculum provided during the UCSF Summer Student Research Program (SSRP) will consist of **required** and **elective** content available through the UCSF learning management system known as the Collaborative Learning Environment (CLE). You will receive access to the CLE at the beginning of the program. Refer to the CLE for all links, document turn-ins, and deadlines.

The **required curriculum** consists of synchronous and asynchronous programmatic lectures and trainings in addition to the research project with your mentor. It is expected that these items combined will take approximately 20-30 hours per week. Required curriculum will be provided through synchronous Zoom sessions on most Tuesdays & Thursdays from 2:00-5:00 pm. You are expected to be present and interactive for all synchronous Zoom sessions. The other required content, including your research development and training modules will happen outside of the synchronous Zoom sessions at a convenient time for you and your mentor. It is important to organize your time to complete these assignments so you don't fall behind. The required curriculum cannot be substituted, and all aspects must be attended for program completion.

The **elective curriculum** consists of a wide range of optional content that we have curated and believe to have value for your educational enrichment and career development. The elective curriculum will consist of both synchronous and asynchronous options, including UCSF Grand Rounds (hospital-wide presentations from clinical staff) and previously recorded seminars from past summers. The individual events, including their dates and applicable times, will be posted on the CLE.

Revised 4/26/24

Summer Student Research Program Curriculum

Required Items to be Completed During First Week of the Program

- Safety training through UC Learning – 4 modules
- Collaborative Institutional Training Initiative (CITI) courses – 3 modules
- Foundational Training in DEI – 1 module

Required Items for Weekly Curriculum

- Participation in every Tuesday and Thursday lecture on Zoom from 2-5pm PST
- Participation in 5 journal clubs offered during the weekly curriculum
- Participation in 1 flash talk offered during the weekly curriculum (*time TBD*)
- Participation in occasional special events that are dependent on your funding source

Programmatic Requirements for all students

- Attend Program Orientation on **Tuesday, June 11th at 1:00-5:00 pm**
- Fill out pre- and post-program online evaluations
- Turn in Personal Statement & headshots by **Thursday, June 20th by 5:00 pm**
- Turn in Research Proposal by **Wednesday, June 26th by 5:00 pm**
- Turn in Research Abstract by **Wednesday, July 17th by 5:00 pm**
- Attend at least 1 office hour session offered on Wednesday afternoons at **4:00-5:00 pm**
- Present a short talk at Symposium by Zoom on **Thursday, August 1st** (*time TBD*)
- Attend & present poster at Symposium on **Friday, August 2nd** (*time TBD*)
- Each funding program (NIH, CIRM & DDCF) also has a few other specific requirements. You will be informed about your funding source during orientation.

Social Networking Opportunities

- Small group discussions led by returning students to discuss lectures & related topics
- Social events with your SSRP colleagues

Applications Used in Virtual Programming

- Synchronous Presentations: Zoom
- Learning Management System: CLE (Moodle platform)
- Communications: Slack

Program Contact Information

Program Co-Director:	Ellen Fung, PhD	ellen.fung@ucsf.edu
Program Co-Director:	Marsha Treadwell, PhD	marsha.treadwell@ucsf.edu
Program Manager:	David Killilea, PhD	david.killilea@ucsf.edu
Program Coordinator:	Roialle Jennings	roialle.jennings@ucsf.edu
Student Coordinator:	Lisa Romero	lisa.romero@ucsf.edu

Summer Student Research Program
Lecture Series 2024

Date	Event	Event Title	Speaker/Leader
Week 1	**Theme: Getting Oriented**		
6/4/24	Program Quick Start	2024 SSRP Orientation (Part 1)	SSRP Leadership
		Small Group Time (introductions & fun facts)	
6/5/24	SSRP Office Hours	Office Hours & questions about onboarding	Dr. Ellen Fung & Dr. David Killilea
6/6/24	Thursday SSRP Programming	Bioethics in Research	Dr. Ellen Fung & Dr. David Killilea
		Searching & Understanding Scientific Literature	Dr. David Killilea
		Checking into the SSRP experience	Karen Daley (Many Rivers Healing)
Week 2	**Theme: Cardiology & Pulmonology**		
6/11/24	Program Orientation	2024 SSRP Orientation (Part 2)	SSRP Leadership
6/12/24	SSRP Office Hours	Office Hours	Dr. Ellen Fung & Dr. David Killilea
6/13/24	Thursday SSRP Programming	Unraveling the Mysteries of Heart Rhythm Disorders	Dr. Jan Christoph (UCSF)
		Pulmonary Physiology for the SSRP	Dr. Charlene Blake (UCSF)
		Small Group Time	
Week 3	**Theme: Hematology & Stem Cell Biology**		
6/17/24	Make-up Orientation	2024 SSRP Orientation (Make-up)	Dr. Ellen Fung & Dr. David Killilea
6/18/24	Tuesday SSRP Programming	Journal Club 1: Randomized Clinical Trial paper	Dr. Ellen Fung
		Pediatric Hematopoietic Stem Cell Transplanation (HSCT)	Marci Moriarty & Amy Solari (UCSF)
		Patient Perspective with Thalassemia and BMT transplant	Olivia Stahl (Oregon)
6/19/24	Juneteenth Celebration		
6/20/24	Thursday SSRP Programming	Flash Talks 1-7	SSRP students
	Personal Statement & Photos Due	Day in the life of a Laboratory Technician	Mikail Alejandro (UCSF)
		UCSF Investigational Cell Therapy Program	Dr. Brian Shy (UCSF)
6/21/24	Stem Cell Production Facility Tour	UCSF-Thermo Joint Stem Cell Facility	Jessica Gonsalves (UCSF) & Lisa Bunning (Thermo)
6/21/24	Pizza Party		

Summer Student Research Program Lecture Series 2024

Week 4	Theme: Oncology & Gene Therapy		
6/25/24	Tuesday SSRP Programming	Journal Club 2: Basic Science paper	Dr. David Killilea
		The Value of Gene Therapy Treatments for Sickle Cell Disease	Dr. Geoffrey Lomax (CIRM)
		Small Group Time	
6/26/24	SSRP Office Hours	Office Hours	Dr. Ellen Fung & Dr. David Killilea
6/27/24	Thursday SSRP Programming	Flash Talks 8-14	SSRP students
		Dr. Dooalots (Life of a Periatric Hematologist-Oncologist)	Dr. Krystle Frazier (UCSF)
		Patient Perspective with Cancer	Dr. Alex Keir (UCLA)
6/28/24	Kanbar/Career Panel	Clinical simulation at the UCSF Kanbar Center	Dr. Patricia De Castro (UCSF) & Dr. Mindy Ju (UCSF)
		Career Paths in STEM luncheon	UCSF Fellows & Residents Panel
Week 5	**Theme: Mental Health**		
7/2/24	Tuesday SSRP Programming	Journal Club 3: Case-Control Study paper	Dr. Ellen Fung
		Discussion centered around the movie 'A Table of Our Own'	Dr. Letetia Brown (UCSF) & Ayize Jama-Everett (GTU)
7/3/24	SSRP Office Hours	Office Hours	Dr. Ellen Fung & Dr. David Killilea
7/4/24	US Independence Day		
Week 6	**Theme: Social Drivers of Health**		
7/9/24	Tuesday SSRP Programming	Journal Club 4: Cross-Sectional Study paper	Dr. David Killilea
		Day in the life of a MPH Student	Amber Peake (UCB)
		Day in the life of a Medical Student	Maryum Haidari (UCSD)
7/10/24	SSRP Office Hours	Office Hours	Dr. Ellen Fung & Dr. David Killilea
7/11/24	Thursday SSRP Programming	Flash Talks 15-21	SSRP students
		The Novel Interventions in Children's Healthcare (NICH) Program	Annemarie Stone & Zenaida Navarro (UCSF)
		Incorporating Human-Centered Design into Health Equity Work	Dr. Archna Eniasivam (UCSF)

Summer Student Research Program Lecture Series 2024

Week 7	Theme: Global Health Science		
7/16/24	Tuesday SSRP Programming	Day in the Life of a Medical Resident	Dr. Emeka Ajaelo (UCSF BCH)
		California Statewide Study of People Experiencing Homelessness	Dr. Margot Kushel (UCSF)
		Small Group Time	
7/17/24	SSRP Office Hours	Office Hours	Dr. Ellen Fung & Dr. David Killilea
7/18/24	Thursday SSRP Programming	Flash Talks 22-28	SSRP students
		Immigrant Health in the Clinical Setting	Dr. Raul Gutierrez (UCSF)
		Pandemics, Humanity, & Tuberculosis	Dr. Babak Javid (UCSF)
7/19/24	Summer Party		
Week 8	**Theme: AI & Machine Learning in Medicine**		
7/23/24	Tuesday SSRP Programming	Journal Club 5: Retrospective Study paper	Dr. Ellen Fung
		How AI Can Help Predict Chronic Disease	Dr. Marina Sirota (UCSF)
		Advice on Posters & Presentations	Dr. Ellen Fung & Dr. David Killilea
		Small Group Time	
7/24/24	SSRP Office Hours	Office Hours	Dr. Ellen Fung & Dr. David Killilea
7/25/24	Thursday SSRP Programming	Flash Talks 29-36	SSRP students
		Day in the life of a Biotech Research Associate	Bonny Alvarenga (Arcus Biosciences)
		Workshop on AI/ML in Research & Medicine	Albert Lee (UCSF)
Week 9	**Theme: Wrapping It Up**		
7/30/24	Tuesday SSRP Programming	You made it! What to do next?	Dr. Ellen Fung & Dr. David Killilea
		Checking out from the SSRP experience	Karen Daley (Many Rivers Healing)
		Small Group Time	
7/31/24	SSRP Symposium – Student Presentations	Oral Presentations Part 1	SSRP Leadership & SSRP students
8/1/24	SSRP Symposium – Student Presentations	Oral Presentations Part 2	SSRP Leadership & SSRP students
8/2/24	SSRP Symposium – Student Posters & Ceremony	Poster Presentations	SSRP students
		Awards Ceremony & Certificates	SSRP Leadership

Mentor Monday

Volume 2 | June 24, 2024

SSRP Mentor Monday

As of today we are entering week four of programming. See below for upcoming details on programming this week. We enjoyed getting to interact with all the students as we continue to learn about them and their interest. They are an impressive bunch of students!

What your intern was up to recently

- Students have hit the ground running and have done a great job diving into the trainings, our Tues/Thurs seminars, and navigating tech issues with UCSF.
- All students have gone thru orientation, badging is still being worked out for some students

What Student have been up to:

- First group of students completed their 3 min flash talks
- First journal club focused on how to review a randomized clinical trial
- Ethics lecture
- First day in life of lecture- from an SSRP alum who is working as a Lab Tech at UCSF
- Heard about bioengineering to understand cardiac arrythmias, video of inside an operating room for lung transplantation, stem cell and gene therapy, patient shared their experience with gene therapy

This upcoming week at a glance: Oncology & Gene Therapy

- 6/25 @ 2-5: Tuesday SSRP online seminars (required & on Zoom)
- 6/26 @ 4-5: SSRP Office Hours (optional & on Zoom)
- **Research Proposals due Wednesday at 5PM (6/26)**
- 6/27 @ 2-5: Thursday SSRP online seminars (required & on Zoom)
- 6/28 @ 9-1: Kanbar Experience (Undergraduates only - in person)

Trainings/ Certifications:
ALL students were required to complete UCSF required trainings in the following 6 areas.

1. Gender Discrimination & Sexual Harassment
2. Cyber Security
3. Blood Borne Pathogens Safety
4. Biosafety
5. Diversity, Equity, and Inclusion
6. CITI Subject Protection (completed through external training website)

View Your Students Curriculum

Students will be using UCSF's Collaborative Learning Experience (CLE) to access modules pertaining to our weekly themed lectures. Additionally, this is where students abstracts, proposals, and personal statements will be submitted as well as have access to elective information such as grand rounds.
Here is the information for ***GUEST ACCESS***
Password: ssrp2024

Please feel free to log in and view what else your students will be involved with this summer.

Kanbar Simulation for UG Students

When: Friday June 28th
9:00am - 1:00 pm
Where: San Francisco, CA

The Kanbar Simulation Center is a medical training facility that offers clinical simulations for learners. Simulation labs will be followed by a physician resident panel.

Thinking Deeper About Health and Community

"Without community, there is no liberation...but community must not mean a shedding of our differences, nor the pathetic pretense that these differences do not exist."
— Audre Lorde

We shared with students that their differences and connection to community are the unique things that will aid them on their journey through STEM. We reminded them to embrace these differences because they will not only serve their individual communities but the broader communities that they engage with and serve.

Mentor Resources

We have created a folder in the Box Drive for all SSRP Mentors. This box file will contain all the 'Mentor Monday' emails in case you miss any, also includes copies of workshop slides, orientation slides and other relevant material.
https://ucsf.box.com/s/d2pn3frh52j4xlyqv59n5a1ae2d8ein2

Mentor Reimbursements

All mentors may be reimbursed up to $1000. Detailed information was sent out via email. **Here is a brief summary reminder...**

For UCSF Faculty/Staff Mentors: Please order supplies directly through the BearBuy system. The "cart" should then be assigned to Roi Jennings: roialle.jennings@ucsf.edu who will submit the purchase on your behalf with the SSRP chartstring account. Please send email to Roi once you have sent her your cart.

For Non-UCSF Mentors (this includes BCH-Oakland): Send list of supplies to Roi Jennings in an email: roialle.jennings@ucsf.edu, and she will send list to purchaser so the items can be ordered in BearBuy. We will try to order the exact item or its equivalent. If items cannot be found in BearBuy, Roi will contact you with an alternative plan.

Communication Reminder

Your student should have received their UCSF email and access to UCSF drives/library.

We have asked students to check their email regularly, but good to check in with your student about best way for the 2 of you to communicate, including how frequently to meet during the week.

Mentor Monday

Volume 3 | July 8, 2024

SSRP Mentor Monday

We have made it to the sixth week of programming! We are coming into the home stretch of our program and have gotten a chance to hear some of the students flash talks; where they describe their research project in 3 minutes. Very impressive work!

What your intern was up to recently

Students are attended their first SSRP social gathering -- a pizza party game night. Alumni spearheaded this effort and we hope to continue to help establish and maintain community with like minded peers.

This week theme is "Social Drivers of Health." Programming with the walk through a scientific journal article entitled "Prevalence and Nature of Sexist and Racial/Ethnic Microaggressions Against Surgeons and Anesthesiologists" found in CLE.

SSRP Alumni **Amber Peake (UCB)** will talking to us about being a MPH student as well as from Medical student and SSRP Alum **Maryam Haidari (UCSD)** for our **Day in the Life series**. On Thursday students will get to hear more flash talks from their peers as well as a talk from **UCSF's Annemarie Stone & Zenaida Navarro** on the Novel Interventions of

Children's Health (NICH) Program. **Dr. Archna Eniasivam (UCSF)** will close us out with a talk on *"Systems Design Methodology to Reduce Healthcare Disparities."*

Week 6 at a glance:

- 7/09 @ 2-5: Tuesday SSRP online seminars (required & on Zoom)
- 7/10 @ 4-5: SSRP Office Hours (optional & on Zoom)
- 7/11 @ 2-5: Thursday SSRP online seminars (required & on Zoom)

View Your Students Curriculum

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Password: ssrp2024

Please feel free to log in and view what else your students will be involved with this summer.

Student Abstract's are Due

When: Wednesday, July 17th
5:00 pm
Where: CLE turn in feature

Please note that the abstract should be a MAX of 350 words.Templates can be found at the link below.
Abstract Template

Thinking Deeper About Health and Community

"Health inequalities and social determinants of health are not a footnote to the detriments of health. They are the main issue." - Michael Marmot

Mentor Resources

We have created a folder in the Box Drive for all SSRP Mentors. This box file will contain all the 'Mentor Monday' emails in case you miss any, also includes copies of workshop slides, orientation slides and other relevant material.
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SSRP 43rd Annual Symposium Save the Date

When: Friday, August 2nd
Time: 12:00PM - 5:00PM
Where: MLK Research Building
5700 Martin Luther King Jr Way
Oakland, CA 94609

SSRP 2- Day Oral Presentations

When: Wed., July 31st & Thurs., August 1st
Time: 1- 5PM PST
Where: Zoom

Student order and days they will be presenting TBD

View Oral Presentations HERE

SSRP is asking for Photos!

As we prepare our abstract book we would love to include photos of mentors and their SSRP interns! If you have any please share them with us!

https://ucsf.box.com/s/nrn6875zb8x404nouwef4xxs0q3xv80l

Key dates:

- **350 Word Abstract Due:** Wednesday, July 17th by 5:00 pm
- **Research Symposium**, Friday August 2nd at MLK Research Building, Time 12-5PM
- **Synchronous Sessions** – *Required* activity that all students should attend
  - Tuesdays 2:00-5:00 pm (PST) – SSRP programming via Zoom
  - Thursdays 2:00-5:00 pm (PST) – SSRP programming via Zoom
- **Weekly Research Project Sessions** – to be worked out with you and your student

MENTORING TIPS

- Start by getting to know your student and allowing them to know you. This will ease student anxiety and allow for more open communication.
- Write down your expectations and share them with your student.

Fun-g Friday

***Fun*-g Friday**

Volume 1 | May 31, 2024

Welcome to the SSRP 2024 cohort!

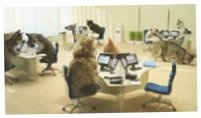
We hope you are feeling excited about a summer of fun, science, and community! Programming begins on Monday, June 3rd. Please read this email *to the end* as it contains important information on what to expect, how to put your best foot forward, and who to get in contact with for your questions.

Week 1*: What to Expect*

- You will get access to your UCSF email credentials on **Monday, June 3, 2024**. Set this up immediately! You will also need to download the DUO authentication app to your phone to access all UCSF platforms via **UCSF MyAccess**.
- You will access the Collaborative Learning Environment (CLE) which contains all materials, due dates, and links for the Summer.
- You will complete ALL required trainings by **Friday, June 7.**
- We will virtually **meet on Zoom** on **Tuesday and Thursday from 2-5PM. Bring questions!***
- You will meet with your mentor(s) to discuss expectations and plans for the next 9 weeks.
- You will complete pre-program surveys made available in CLE.
- You will obtain your badge.

*For students who will still be taking finals during the first week of programming, please join the T/TH Zoom sessions if at all possible.

Important Contacts



General Questions:
Send a message to the Whatsapp

Program-Specific Questions:
roialle.jennings@ucsf.edu
or
lisa.romero@ucsf.edu

Day-to-Day Questions:
Your near-peer mentor

Lab-specific questions:
Your mentor(s)

Technology issues:
(415)514-4100
or
it.ucsf.edu

Student Locations and Transportation Recs

We will be communicating via WhatsApp all Summer!

Open this link to join our WhatsApp Community:
https://chat.whatsapp.com/LRnu0aiUAPn8oOy3Wdcjs6
This Whatsapp community will contain announcements, and will also be an informal place to share news, ideas, and ask questions.

Badge Access

You will need to pick up a badge prior to starting your in-person research partnerships. Badging is contingent on completing your HR paperwork. Instructions **according to your campus** are located below:

- **MLK Research Building and Children's Hospital Oakland: Ms. Jennings will send the necessary paperwork and badging hour to information to these individuals by EOD Friday.**
- **UCSF Mission Bay: schedule an 15-minute, in-person appointment using this link, available M-F**
- **UCSF Parnassus: schedule a 15-minute, in person appointment using this link, available M-F**
- **UC Berkeley: UCB team will be in contact regarding on-boarding and badging. If you have not received any communication from UCB please contact Roi Jennings ASAP**

*Please note UCSF folks (those located in SF) can go to either site (Parnassus or Mission Bay) to schedule a badge appointment

Zoom Invitation for All Tuesday/Thursday sessions and Wednesday Office Hours

Use this link for all synchronous meetings taking place each Tuesdays and Thursdays at 2–5PM from June 4 - August 2 (except holidays).

Also use this link for Office Hours each Wednesday at 4-5PM. Stop by to ask any questions about programming or just say hey!

One Click Join from a PC, Mac, Linux, iOS or Android device:
https://ucsf.zoom.us/j/94903522171?pwd=OFgvbnBXdSsyYmhLeUptSjhxa1BRUT09

Zoom information, if needed:
Meeting ID: 949 0352 2171
Password: 562649
Phone or Conference room password: 562649

So when do we meet in-person?

In-person orientation takes place on June 11, 2024 at 12PM at 5700 MLK Jr Way in Oakland. Detailed information available soon.

Lunch is provided. Dress code is business casual (we WILL take pictures)!

We are looking forward to meeting you and supporting you! Don't hesitate to reach out with questions!

-Ellen, Marsha, David, Roi, & Lisa

Fun-g Friday

***Fun*-g Friday**

Volume 4 | June 21, 2024

Week 3: Hem & STEM

A week of firsts. The first assignment in CLE, the first round of flash talks (great job, everyone!), the first near-peer social activity, and the first week of journal club. Way to go! Hopefully, you are all learning lots about your projects, and are in the swing of things for the summer.

Coming Up!

- Next week, **Oncology and Gene Therapy Curriculum** via Zoom
  - **Please** turn your cameras on when interacting with speakers. It goes a LONG WAY! You can also thank our speakers via EllaCard (look for an email from Holly Duden).
- **Research Proposals due June 26th in CLE**
  - Templates and examples **available in CLE**.
- Kanbar Simulation Center on **Friday, June 28th**
  - **Who?** SSRP undergraduates
  - **When?** 8AM for transportation to San Francisco campus. Simulations start at 9AM.
  - **Where?** MLK Research Building for transportation UCSF Kanbar Simulation Center, or meet us at the Parnassus Library if coming from San Francisco
  - **What?** The Kanbar Simulation Center is a medical training facility that offers clinical simulations for learners. Simulation labs will be followed by a physician resident panel. Lunch provided.
- **Flash Talk Speakers for Thursday, June 27th:**
  - Ari
  - Aimee
  - Belem
  - Kyle
  - Shea
  - Vy
  - Yassi

Pizza Party Reminder

- Alumni-led pizza party will be held at the MLK Research Building on **Friday, 6/21 at 5PM**. Contribute to the **Spotify playlist!**
- Games will be provided!
- Address: 5700 MLK Drive, Oakland, CA

Upcoming Community Events

KMJ WARRIOR HEALTH & WELLNESS EXPO

- **KMJ Warrior Health & Wellness Expo in Oakland**: Saturday, June 29, 2024 from 9:30 am – 1:00 pm at DeFremery Park. **Register** online!
- **Free Museum Days:**
  - **de Young and Legion of Honor Art Museums:** FREE every Saturday for Bay Area residents
  - **Asian Art Museum:** FREE first Sunday of the Month
  - **Exploratorium and Cal Academy of Sciences:** FREE for CA library card holders via Discovery & Go
  - **Museum of the African Diaspora:** FREE every second Saturday
  - **Oakland Museum of CA:** FREE first Sunday of the month
- **Pride Events:**
  - **Cal Academy Night Life:** Pride on 6/27 at 6PM-- tickets for purchase online
  - **SF Pride Celebration:** Free at Civic Center on June 30
    - You can register to walk with UCSF (ends 6/21)!

Week 5 Recap: A Table of Our Own

Mental health matters, and this week you spoke with Leticia Brown and Ayize Jama Everett, experts on healing and creating safe spaces through plant medicine.
Hopefully, you enjoyed your day off, and found a reprieve from the heat.

Coming Up!

- Next week, **Social Drivers of Health Curriculum** via Zoom
  - **Please** turn your cameras on when interacting with speakers. It goes a LONG WAY! You can also thank our speakers via EllaCard (look for an email from Holly Duden).
- Flash talk speakers on Thursday, July 11th:
  - Adriana
  - Kristy
  - Nghi
  - Tiona
  - Rue
  - Isabella
  - Mina
- Research Abstracts due **July 17th**
  - Need help finding primary literature? Hear from a librarian via the **module in CLE**.
  - Need a template? Check this document **out**, and look at previous abstract books on the **SSRP website**.

Save the Date: Olympics-Themed Party

- **When**: Friday, July 19th at 12PM
- **Where**: MLK Research Building (5700 MLK Jr Way, Oakland)
- **What**: Free food and games, what more could one want?!
- **Who**: SSRP and the Dept. of Pediatrics
- **Why:** Bragging rights

We Want Your Photos!

Have pictures from your experiences this summer? Please upload them to **CLE** by July 14th at midnight.

Need help Coding?

Upcoming FREE Community Events (public transit friendly)

- **Free Museum Days:**
  - **de Young and Legion of Honor Art Museums:** FREE every Saturday for Bay Area residents
  - **Asian Art Museum:** FREE first Sunday of the Month
  - **Exploratorium and Cal Academy of Sciences:** FREE for CA library card holders via Discovery & Go
  - **Museum of the African Diaspora:** FREE every second Saturday
  - **Oakland Museum of CA:** FREE first Sunday of the month
- **Free Yoga** in **Salesforce Park**: Fridays at 12:30PM
- **Free Zine Workshop** at **Silver Sprocket**. Register **online** for the event on **July 13th at 7PM.**

Journal Clubs

www.nature.com/scientificreports

scientific reports

OPEN

Genesis of fecal floatation is causally linked to gut microbial colonization in mice

Syed Mohammed Musheer Aalam[1], Daphne Norma Crasta[1], Pooja Roy[1], A. Lee Miller II[2], Scott I. Gamb[3], Stephen Johnson[4], Lisa M. Till[5], Jun Chen[4], Purna Kashyap[5] & Nagarajan Kannan[1,6,7]

The origin of fecal floatation phenomenon remains poorly understood. Following our serendipitous discovery of differences in buoyancy of feces from germ-free and conventional mice, we characterized microbial and physical properties of feces from germ-free and gut-colonized (conventional and conventionalized) mice. The gut-colonization associated differences were assessed in feces using DNA, bacterial-PCR, scanning electron microscopy, FACS, thermogravimetry and pycnometry. Based on the differences in buoyancy of feces, we developed levö in fimo test (LIFT) to distinguish sinking feces (sinkers) of germ-free mice from floating feces (floaters) of gut-colonized mice. By simultaneous tracking of microbiota densities and gut colonization kinetics in fecal transplanted mice, we provide first direct evidence of causal relationship between gut microbial colonization and fecal floatation. Rare discordance in LIFT and microbiota density indicated that enrichment of gasogenic gut colonizers may be necessary for fecal floatation. Finally, fecal metagenomics analysis of 'floaters' from conventional and syngeneic fecal transplanted mice identified colonization of >10 gasogenic bacterial species including highly prevalent *B. ovatus*, an anaerobic commensal bacteria linked with flatulence and intestinal bowel diseases. The findings reported here will improve our understanding of food microbial biotransformation and gut microbial regulators of fecal floatation in human health and disease.

Abbreviations

FMT	Fecal microbiota transplant
LIFT	Levö in fimo test
PCR	Polymerase chain reaction
EM	Electron microscope
DNA	Deoxyribonucleic acid
FACS	Fluorescence-activated cell sorting
UFP	Undigested food particles
g	Gram
mg	Milligram
µg	Microgram
TGA	Thermogravimetric analysis
TFS	Trump's fixative phosphate-buffered solution
PBS	Phosphate buffered saline
SE	Secondary electron
NO	Nitric oxide
H_2	Hydrogen
CO_2	Carbon dioxide

[1]Division of Experimental Pathology, Department of Laboratory Medicine and Pathology, Mayo Clinic, 200 First St SW, Rochester, MN 55905, USA. [2]Department of Orthopedic Surgery, Mayo Clinic, Rochester, MN 55905, USA. [3]Division of Computational Biology, Department of Quantitative Health Sciences, Mayo Clinic, Rochester, MN 55905, USA. [4]Department of Gastroenterology, Mayo Clinic, Rochester, MN 55905, USA. [5]Center for Regenerative Biotherapeutics, Mayo Clinic Cancer Center, Mayo Clinic, Rochester, MN 55905, USA. [6]email:

Environmental Research 245 (2024) 118043

Contents lists available at ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/envres

Residential exposure to magnetic fields from transformer stations and risk of childhood leukemia

Marcella Malavolti [a], Carlotta Malagoli [a], Lauren A. Wise [b], Maurizio Poli [c], Barbara Notari [c], Irene Taddei [c], Sara Fabbi [d], Sergio Teggi [d], Erica Balboni [a,e], Alessia Pancaldi [f], Giovanni Palazzi [f], Marco Vinceti [a,b,*], Tommaso Filippini [a,g]

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[b] Department of Epidemiology, Boston University School of Public Health, Boston, MA, USA
[c] Emilia-Romagna Regional Agency for Environmental Prevention and Energy (ARPAE), Emilia-Romagna Region, Italy
[d] Department of Engineering 'Enzo Ferrari', University of Modena and Reggio Emilia, Modena, Italy
[e] Health Physics Unit, Modena Policlinico University Hospital, Modena, Italy
[f] Pediatric Oncology and Hematology Unit, Department of Medical and Surgical Sciences for Mothers, Children and Adults, University of Modena and Reggio Emilia, Modena, Italy
[g] School of Public Health, University of California Berkeley, Berkeley, CA, USA

ARTICLE INFO

Handling editor: Jose L. Domingo

Keywords:
Case-control study
Childhood leukemia
Transformer rooms
Magnetic fields
Risk factors

ABSTRACT

Background: Several studies have documented an increased risk of leukemia among children exposed to magnetic fields from high-voltage power lines, with some evidence of dose-response relation. However, findings in some studies have been inconsistent, and data on the effects of different sources of exposure are lacking. In this study, we evaluated the relation of childhood leukemia risk to exposure to magnetic fields from transformer stations.
Methods: We conducted a population-based case-control study in a pediatric population of two Northern Italian provinces of Modena and Reggio Emilia. We included 182 registry-identified childhood leukemia cases diagnosed during 1998–2019 and 726 population controls matched on sex, year of birth, and province of residence. We assessed exposure by calculating distance from childhood residence to the nearest transformer station within a geographical information system, computing disease odds ratios (ORs) and 95% confidence intervals (CIs) using conditional logistic regression, adjusting for potential confounders. We evaluated exposure using two buffers (15 m and 25 m radius) and assessed two case groups: leukemia (all subtypes) and acute lymphoblastic leukemia (ALL).
Results: Residing within 15 m of a transformer station (vs. ≥15 m) was not appreciably associated with risk of leukemia (all subtypes) or ALL. We found similar results using a less stringent exposure buffer (25 m). Among children aged ≥5 years, the adjusted ORs were 1.3 (95% CI 0.1–12.8) for leukemia and 1.3 (95% CI 0.1–12.4) for ALL using the 15 m buffer, while they were 1.7 (95% CI 0.4–7.0) for leukemia and 0.6 (95% CI 0.1–4.8) for ALL using the 25 m buffer.
Conclusions: While we found no overall association between residential proximity to transformer stations and childhood leukemia, there was some evidence for elevated risk of childhood leukemia among children aged ≥5 years. Precision was limited by the low numbers of exposed children.

1. Introduction

Leukemia is the most common type of childhood cancer. Environmental risk factors for childhood leukemia are poorly understood but include exposure to ionizing and non-ionizing radiation, pesticides, solvents, tobacco smoke, air pollution from motorized traffic and other sources (Buser et al., 2022; Filippini et al., 2019; Karalexi et al., 2021; Malagoli et al., 2016, 2023; Malavolti et al., 2023; Onyije et al., 2022;

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https://doi.org/10.1016/j.envres.2023.118043
Received 14 December 2023; Received in revised form 23 December 2023; Accepted 23 December 2023
Available online 24 December 2023
0013-9351/

Makaremnia et al. BMC Psychol (2021) 9:43
https://doi.org/10.1186/s40359-021-00547-0

BMC Psychology

RESEARCH ARTICLE Open Access

Effects of a positive thinking program on hope and sleep quality in Iranian patients with thalassemia: a randomized clinical trial

Somayeh Makaremnia[1], Marieh Dehghan Manshadi[2] and Zahra Khademian[3*]

Abstract

Background: Thalassemia have a negative impact on the patients' psychological health and sleep quality. This study aimed to determine the effects of a positive thinking training program on hope and sleep quality of patients with thalassemia major.

Methods: This randomized clinical trial was conducted on 78 patients with thalassemia major including 36 males (46.2%) and 42 females (53.8%) with a mean age of 25.56 ± 29.6 in Iran. Subjects were randomly assigned into experimental and control groups. Experimental group received 16 h training based on positive thinking materials published by Martin Seligman. Control group received only usual programs. Data were collected at baseline, as well as immediately and one month after the intervention, using Snyder's Hope Scale and the Pittsburgh Sleep Quality Index. Data analysis was performed using SPSS Software 18.0; statistical tests included the independent T-test, the Chi-square, Mann Whitney, and Friedman test. Significance level was set at 0.05 in this study.

Results: The experimental group had a significantly higher mean hope score compared to the control group immediately (45.38 ± 7.82 vs. 35.32 ± 5.54, $P < 0.001$) and one month following intervention (44.67 ± 3.47 vs. 35 ± .54, $P < 0.001$). Moreover, the mean sleep quality scores of the experimental group was significantly greater than that for control group immediately (5.35 ± 2.02 vs. 7 ± 2.4, $P = 0.004$) and one month after the intervention (4.23 ± 2.2 vs.7.02 ± 3.03, $P < 0.001$).

Conclusion: Since our training program on positive thinking improved hope and quality of sleep in patients with thalassemia major, we recommend the use of such courses as an important step toward promotion of hope and sleep quality among these patients.

Trial registration The name of the registry: Iranian Registry of Clinical Trials. Trial Registration Number: IRCT2017010431774N1. URL of the trial registry record: https://en.irct.ir/trial/24923. Registration Date: 07/03/2017.

Keywords: Beta-Thalassemia, Hope, Optimism, Positive psychology, Sleep quality

Background

Thalassemia is the most common recessive genetic disorder in the world. The annual birth of individuals with beta thalassemia is estimated 22,989. In addition, it is estimated that 80 million people worldwide carry beta thalassemia and about ninety percent of annual incidence of major beta thalassemia occur in low- and middle-income countries [1]. Thalassemia has a prevalence

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Full list of author information is available at the end of the article

Research

JAMA Surgery | Original Investigation

Prevalence and Nature of Sexist and Racial/Ethnic Microaggressions Against Surgeons and Anesthesiologists

Neha T. Sudol, MD; Noelani M. Guaderrama, MD; Pamela Honsberger, MD; Jennifer Weiss, MD; Qiaowu Li, PhD; Emily L. Whitcomb, MD, MAS

IMPORTANCE Workplace mistreatment can manifest as microaggressions that cause chronic, severe distress. As physician burnout becomes a global crisis, quantitative research to delineate the impact of microaggressions is imperative.

OBJECTIVES To examine the prevalence and nature of sexist and racial/ethnic microaggressions against female and racial/ethnic-minority surgeons and anesthesiologists and assess the association with physician burnout.

DESIGN, SETTING, AND PARTICIPANTS This cross-sectional survey evaluated microaggressions and physician burnout within a diverse cohort of surgeons and anesthesiologists in a large health maintenance organization. A total of 1643 eligible participants were sent a recruitment email on January 8, 2020, 1609 received the email, and 652 replied, for a response rate of 41%. The study survey remained open until February 20, 2020. A total of 588 individuals (37%) were included in the study after exclusion criteria were applied.

EXPOSURES The Maslach Burnout Inventory, the Racial Microaggression Scale, and the Sexist Microaggression Experience and Stress Scale.

MAIN OUTCOMES AND MEASURES The primary outcomes were prevalence and nature of sexist and racial/ethnic microaggressions against female and racial/ethnic-minority surgeons and anesthesiologists using the Sexist Microaggression Experience and Stress Scale and Racial Microaggression Scale. Secondary outcomes were frequency and severity of microaggressions, prevalence of physician burnout, and associations between microaggressions and physician burnout.

RESULTS Data obtained from 588 respondents (249 [44%] female, 367 [62%] racial/ethnic minority, 224 [38.1%] 40-49 years of age) were analyzed. A total of 245 of 259 female respondents (94%) experienced sexist microaggressions, most commonly overhearing or seeing degrading female terms or images. Racial/ethnic microaggressions were experienced by 299 of 367 racial/ethnic-minority physicians (81%), most commonly reporting few leaders or coworkers of the same race/ethnicity. Criminality was rare (18 of 367 [5%]) but unique to and significantly higher for Hispanic and Black physicians. Individuals who identified as underrepresented minorities were more likely to experience environmental inequities (odds ratio [OR], 4.21; 95% CI, 1.6-10.75; $P = .002$) and criminality (OR, 14.93; 95% CI, 4.5-48.5; $P < .001$). The prevalence of physician burnout was 47% (280 of 588 physicians) and higher among female physicians (OR, 1.60; 95% CI, 1.03-2.47; $P = .04$) and racial/ethnic-minority physicians (OR, 2.08; 95% CI, 1.31-3.30; $P = .002$). Female physicians who experienced sexist microaggressions (racial/ethnic-minority female physicians: OR, 1.84; 95% CI, 1.04-3.25; $P = .04$; White female physicians: OR, 1.99; 95% CI, 1.07-3.69; $P = .03$) were more likely to experience burnout. Racial/ethnic-minority female physicians (OR, 1.86; 95% CI, 1.03-3.35; $P = .04$) who experienced racial microaggressions were more likely to report burnout. Racial/ethnic-minority female physicians who had the compound experience of sexist and racial/ethnic microaggressions (OR, 2.05; 95% CI, 1.14-3.69; $P = .02$) were more likely to experience burnout.

CONCLUSIONS AND RELEVANCE The prevalence of sexist and racial/ethnic microaggressions against female and racial/ethnic-minority surgeons and anesthesiologists was high and associated with physician burnout. This study provides a valuable response to the increasing call for evidence-based data on surgical workplace mistreatment.

JAMA Surg. 2021;156(5):e210265. doi:10.1001/jamasurg.2021.0265
Published online March 24, 2021.

+ Invited Commentary
+ Supplemental content
+ CME Quiz at jamacmelookup.com

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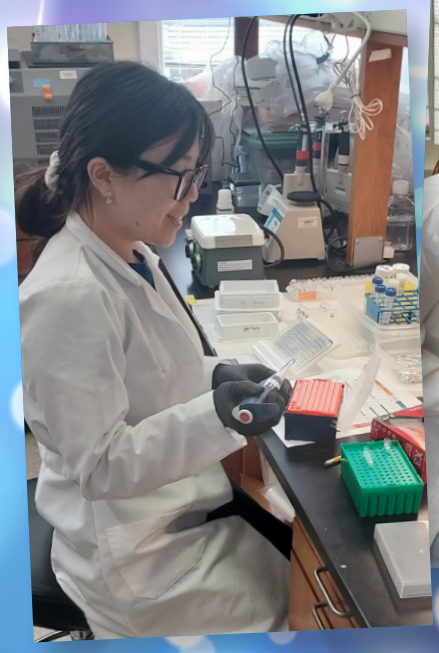
Summer Students 2024


Summer
Students
2024



Summer Students 2024

Summer Students 2024


Summer
Students
2024

Summer Students 2024

Belinda Adelita Bautista Pablo

Developing Patient-Informed Educational Materials to Improve TB Treatment Adherence and Outcomes

Mentor: Mai Baalbaki, MD, MSc

My name is Belinda Bautista Pablo and I am a rising senior year at Holy Names High School. I am currently interested in molecular biology and chemistry, which I have decided I would like to study in college. When I went to my first doctor's appointment in a clinic in America, I remember being in awe of all the foreign medical equipment I saw that were drastically different from the metal tools my grandma used on her patients in our Guatemalan village which, for a long time, was all I knew about medicine. Being exposed to a diverse set of health communities in the Bay Area and in Guatemala has allowed me to understand the health support needed by different people, and that has made me only want to work harder to create an equal medical world. By participating in the UCSF Summer Student Research program, I hope to work for my community and officially begin my medical journey.

INTRODUCTION

Tuberculosis (TB) is caused by the bacteria *Mycobacterium tuberculosis,* which primarily impacts the lungs. TB disproportionately affects vulnerable populations, as shown by the steady increase in TB infections in houseless Bay Area communities. TB infections can be defined as Latent TB Infections (LTBI), an asymptomatic and noninfectious state, or active TB disease, which is symptomatic and infectious. Around 5-10% of people with LTBI will progress to active TB disease in their lifetime. Focusing on testing and treating patients with LTBI decreases the likelihood of TB progressing towards active disease and thus reduces TB transmission within the community.

HYPOTHESIS

Educational materials, created through assessing patients' understanding of TB treatment, will improve TB patients' adherence to treatment.

METHODS

Survey questions are used to identify a patient's understanding of TB testing results and TB treatment. Using a mixed-method approach, quantitative questions are assessed on a Likert scale, and open-ended questions are used for qualitative data. Inclusion criteria are adult patients presenting to the Berkeley Free Clinic for TB testing, in July of 2024. Descriptive statistics and thematic analysis will be used to assess the data. Results will inform the creation of an educational pamphlet using images and patient-informed vocabulary. Results will also be used to plan a community outreach day. This day will focus on TB testing and patient education, to facilitate effective and equitable care dissemination.

ANTICIPATED RESULTS

Patients at the Berkeley Free Clinic may not be aware of the implications of a positive TB test, the next steps, and available treatments. The development of patient-informed education resources can positively impact patient outcomes.

SIGNIFICANCE OF PROJECT

Educating patients using patient-informed educational resources could lead to patient empowerment, less loss to follow-up, and better medication adherence. This could have a positive impact on public health by decreasing rates of untreated LTBI and reducing active TB disease incidence.

Elim Berhe

Interindividual Differential Anticoagulation Effects from Warfarin Therapy

Mentor: Akinyemi O. Oni-Orisan, PharmD, PhD

Hello! My name is Elim Berhe, and this fall, I will be starting my first year at UC Irvine. I will major in Biochemistry and Molecular Biology because I want to become a pharmaceutical scientist and find solutions for various illnesses. I have been passionate about this since I was younger, and participating in SSRP will help me better grasp the molecular pathways behind illnesses and improve my research abilities. I am so grateful to my mentor, Dr. Akinyemi, for welcoming me and allowing me to be directly involved in his lab. This information is essential to my goal of working as a pharmaceutical scientist, where I hope to close the knowledge gap between fundamental research and the creation of new treatments. In addition, I cannot wait to work and learn from the distinguished faculty at UCSF and my fellow program participants. Ultimately, I see a career in pharmaceutical sciences as an ongoing process of innovation, service, and discovery.

INTRODUCTION

Anticoagulant drugs like warfarin, also known as coumadin, prevent blood clots from forming. Correct dosage is essential due to its limited therapeutic window because too little is ineffective and too much can have negative effects. Individual responses differ significantly, but the International Normalization Ratio (INR) test helps determine the required daily dose. Small sample sizes in earlier studies limited the ability of researchers to use genetic information to guide warfarin dosing. By minimizing adverse events and obtaining stable anticoagulation levels compared to conventional methods, a multi-factorial precision warfarin dosing strategy that considers both clinical and genetic factors may enhance patient outcomes.

OBJECTIVE

To identify the genetic factors that are independently associated with differential anticoagulation effects warfarin response and develop algorithm that uses those factors to predict warfarin dose.

METHODS

This study employed a retrospective cohort study, using a dataset from “All of Us,” involving individuals from across the United States. We analyzed patients using warfarin with an INR target of 2-3. The primary outcome was determining the first stable warfarin dosage that followed three consecutive INR readings in the 2-3 therapeutic range, and the main predictors were genetic factors, specifically the CYP2C9 *5, *6, *8, and *11 variants. The first stable warfarin dose for each patient was recorded. With an emphasis on underrepresented populations, we applied regression analysis to find clinical and genetic predictors of steady warfarin dosage

ANTICIPATED RESULTS

Research has shown that CYP2C9 is particularly important in “metabolizing many commonly used drugs, including warfarin,” so we expect that individuals with CYP2C9 variants will require lower warfarin doses to attain stable INR compared to those without these variants.

SIGNIFICANCE OF PROJECT

The understanding of the variables, such as diet, lifestyle, and drug interactions, that impact warfarin dosage and response is the significance of this research. This may result in more accurate warfarin therapy management, lowering the chance of complications and enhancing patient outcomes. To potentially provide safer and more individualized anticoagulation therapy, the research attempts to address the difficulties associated with calculating the proper warfarin dosage and tracking its efficacy through INR testing.

Andres Carrillo Solis

Long-term recording of brain oscillation via chronically implanted subgaleal electroencephalography in patients with Parkinson's disease

Mentor: Stephanie Sandoval-Pistorius, MD, PhD

Hello! My name is Andres Carrillo Solis, and I am a rising senior at UC Berkeley majoring in molecular and cell biology with an emphasis in neurobiology. My research interests in neuroscience stem from my curiosity about familial Alzheimer's disease, a topic that became personal after my paternal grandmother was diagnosed with the disease. Motivated by her diagnosis, I remember reading all the information that fell into my hands related to the topic. Growing up in a small town in Nicaragua, I never thought I would be one of the researchers studying neurological disease at the highest level. This program is my first exposure to research, and I am incredibly grateful to the SSRP team for offering students like me this invaluable opportunity. After graduation, I plan to pursue an MD-PhD program in neuroscience with the goal of contributing to the research and treatment of neurological disorders. I would like to thank my mentor, Dr. Stephanie Sandoval-Pistorius, whose guidance and support have been instrumental throughout the program. Her mentorship has sparked my interest in neurological disease research and inspired me to continue exploring this fascinating field.

INTRODUCTION

Parkinson's disease (PD) is a progressive neurodegenerative disorder. PD is characterized by the loss of dopaminergic neurons in the substantia nigra, leading to motor and non-motor. Deep brain stimulation (DBS) is a surgical treatment for PD. Advancements in DBS technology include the development of deep brain stimulation systems that can record, or sense, brain activity while also delivering therapeutic stimulation. This project explores the use electrodes placed under the scalp, in the subgaleal space, in addition to the DBS electrodes, for long-term recording of cortical brain activity. We aimed to determine the feasibility of subgaleal leads to chronically record cortical gamma (60Hz-65Hz) oscillatory activity throughout the day and determine which of the two tested subgaleal leads best detects cortical activity.

HYPOTHESIS

We expected to be able to detect fluctuations in gamma oscillatory activity (60Hz-65Hz) using both subgaleal lead types, but that the Specify lead will detect a more robust signal.

METHODS

Local field potential (LFP) recordings were analyzed from three individuals with PD who received bilateral STN DBS using a bi-directional DBS pulse generator (Percept PC). In addition to the STN leads, individuals received a paddle-like lead (Specify) in the subgaleal space over one hemisphere and a cylindrical lead (SenSight) over the other hemisphere. Data were collected using the Percept PC timeline function, which continually senses LFP activity within an assigned 5 Hz frequency band, saving average LFP power over consecutive 10-minute intervals. The data was visualized using Python to compare the recordings from both subgaleal lead types.

ANTICIPATED RESULTS

The SenSight and Specify subgaleal leads both detected 60-65 Hz gamma activity, which follows a circadian rhythm. The Specify detects larger amplitude differences in gamma activity.

SIGNIFICANCE OF PROJECT

This study will be the first to evaluate minimally invasive subgaleal leads for long-term brain recordings, which promises to provide new insights into pathological neuronal activity associated with Parkinson's disease. This research will lay the foundation for future studies, enabling more precise understanding and treatment of Parkinson's disease.

Samantha Collins

Influence of the Health E-You/Salud iTu Application on Contraceptive Choices for Adolescent Females

Mentors: Lela Bachrach, MD, MS; Kathleen Tebb, PhD

Hello, my name is Sam Collins and I am a rising junior at UC San Diego, majoring in human biology with a minor in sociology. My passion for the medical field grew quickly in 2021 when I began prioritizing my physical and mental health. Before going to college, my dad unfortunately passed away, and it brought me to reflect on how things could've been different. Ultimately I wondered how I could make a difference in the medical scene for preventative and treatment measures. As of summer 2024, my mother has been hospitalized since January; my frequent visits to see her motivate me to provide a more human approach to the medical field. My goal of being a pediatrician stems from educating kids at an earlier age on preventative measures. The resources, activities, events, and research of SSRP will provide me with knowledge that'll aid me throughout my career. I am beyond thankful to my mentors, Dr. Lela Bachrach and Dr. Kathleen Tebb, for providing me with all their support and knowledge!

INTRODUCTION

Lack of access to comprehensive sexual health and contraceptive education for adolescents can contribute to unsafe sex practices and unintended pregnancies. Youth living in low-income communities may face barriers to accessing clinical services that can result in lower contraceptive use rates and more unintended pregnancies, leading to further health disparities.

HYPOTHESIS

We hypothesize that adolescents will have increased intentions to use contraception or use a more effective method of contraception after using the app compared to baseline.

METHODS

Patients at the UCSF Benioff Children's Hospital Oakland Teen Clinic and school-based health centers will be offered the Health E-You app and asked to fill out a survey about their experience. Data from the app is stored in a secure back-end data system through UCSF's Salesforce platform. The app asks users if they are having sex that puts them at risk of pregnancy, how important it is for them to avoid becoming pregnant at this point in their life, and what (if any) method they are currently using. The app provides recommendations regarding methods that would likely be a good fit. At the end of the app, the user is asked to select which methods are of interest. Despite app recommendations, the app emphasizes the choice is up to the user and encourages them to learn about any method they are interested in.

ANTICIPATED RESULTS

The Health E-You/Salud iTu app will be a useful, interactive health education tool for youth attending an urban federally qualified health center. We anticipate this app will provide the necessary information to aid adolescent females in choosing a contraceptive method, teach them about safer sex practices, and improve the use of non-barrier and barrier contraceptives.

SIGNIFICANCE OF PROJECT

The goal of this project is to research scalable, convenient ways to improve sexual health education (including how to choose amongst various birth control methods), to make high quality reproductive health education accessible and to reduce health inequities.

Sydnie Domingue

Social Epidemiology of Cardiometabolic Risk Factors in Early Adolescents

Mentor: Jason Nagata, MD, MSc

Hello! My name is Sydnie Domingue and I am a rising senior at San Diego State University. Growing up as a minority, I have witnessed structural racism, barriers to accessing healthcare, and racial disparities in healthcare within my own community. Through my goal of becoming a pediatrician, I aspire to promote health equity through advocacy, reduce healthcare disparities among marginalized communities, and further my passion of researching adolescent health. I want to express my gratitude to my mentor, Dr. Nagata, for dedicating time to educate me, integrating me into his research team, and making me feel not just welcomed but also fully supported and valued. Being exposed to supportive physicians, scientists, and diverse undergraduate students has reaffirmed that my career goals are not mere pipe dreams and can become my reality.

INTRODUCTION

The prevalence of childhood cardiometabolic risk and diseases, such as dyslipidemia and type 2 diabetes has increased in recent years. Although prior research has examined sociodemographic factors of metabolic disease in adolescents, there is a paucity in the literature describing sociodemographic associations with cholesterol and diabetes risk specifically in early adolescence.

OBJECTIVE

To examine the associations between sociodemographic factors and cardiometabolic risk factors among a demographically diverse sample of U.S. adolescents aged 10–14 years.

METHODS

This study analyzed cross-sectional data from the Adolescent Brain Cognitive Development (ABCD) Study, Years 2 and 3 (2018 to 2021) that included 11,875 adolescents (10-14 years). Cardiometabolic risk factors including hemoglobin A1c and cholesterol (total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), non-HDL-C) were assessed. Multivariable linear regression models were conducted to estimate the associations between sociodemographic factors (age, sex, race and ethnicity, household income, parental education) and cardiometabolic risk factors (hemoglobin A1c, TC, HDL-C , and non-HDL-C).

ANTICIPATED RESULTS

In this early adolescent sample, the average hemoglobin A1c level was 5.2 (± 0.4)%, the average TC level was 156.6 (± 28.9) mg/dL, and the average HDL-C level was 56.0 (± 12.9) mg/dL. Out of our sample, 0.5% had diabetes (hemoglobin A1c ≥ 6.5%), 7.6% had high TC (≥ 200 mg/dL), and 7.4% had low HDL-C (<40 mg/dL). Older age was associated with lower TC, HDL-C, and non-HDL-C levels. Male sex was associated with higher hemoglobin A1c (coefficient [B] 0.04; 95% confidence interval [CI], 0.00, 0.08; p=0.037) and lower TC (B -3.14; 95% CI, -6.17, -0.11; p=0.042) compared to female sex. Black and Native American race and ethnicity were associated with higher hemoglobin A1c compared to White race. Higher household income was associated with higher TC and HDL-C.

SIGNIFICANCE OF PROJECT

Our findings explore sociodemographic differences in hemoglobin A1c and cholesterol levels among a diverse population of early adolescents, which can inform clinical and public health interventions to prevent these cardiometabolic risk factors.

Yassi Gitiforooz

Assessing Racial Disparities in Birthing: A Retrospective Chart Review Study at B.L.O.O.M. Clinic

Mentor: Dayna Long, MD
Contributing Authors: Nina Feldman; Akua Agyekum

My name is Yassi Gitiforooz and I am a rising junior at UC Berkeley where I'm majoring in Nutritional Science (Physiology and Metabolism), with a minor in Spanish Linguistics. The reason why I love science is because I can get my questions answered. The intricacies of human health are constantly evolving and the fact that I can educate myself on even a small bit is thrilling. I've been lucky enough to know that I wanted to go into medicine from a young age but it wasn't something I was confident in until I immersed myself in the hospital setting last year. My strong sense of belonging made me feel electric, and incredibly inspired. From that moment, my interests in specialty have wandered, but having worked in the Children's Hospital Claremont Clinic has made my decision to go into pediatrics evident. I'm so incredibly excited to work alongside Dr. Long in this journey and learn more about the population of the BLOOM clinic.

INTRODUCTION

In California, Black infants represent about 6% of births. Black mothers and infants experience disproportionately high rates of complications due to historical and structural racism in healthcare. Structural racism derives generational trauma – the population is under stress which requires a surplus of resources to break these cycles. Black Love Opportunity and Outcome Improvement In Medicine (BLOOM) is a clinic which serves Black babies, supported by Black staff. This research will examine rates of Cesarean sections, preterm births, and formula feeding among patients at BLOOM compared to state and national rates.

Nationwide, in 2021, of 17.2% of formula fed infants, 20.9% are Black and 12.7% are White. Of 10.5% of preterm births, 14.6% are Black infants, with 9.4% being White infants. Of 32.4% C-section births, 36.6% are Black infants and 30.9% are White infants.

Statewide, of 16% of formula fed infants, 22.2% are Black and 13.8% are White. Of 9.1% of preterm births, 12.4% are Black infants, with 8.0% being White infants. Of 31% C-section births, 42% are Black infants and 29% are White infants.

OBJECTIVE

It is predicted that BLOOM Clinic patients' prematurity, formula feeding, and C-section rates will be higher than the national and state average. The objective is to eventually uncover the socioeconomic reasons behind these rates.

METHODS

The retrospective chart review study looks at 169 patient charts from Epic. The data will be transferred in Qualtrics for analysis and graph generation. National and statewide rates will be investigated for comparison.

ANTICIPATED RESULTS

Within BLOOM, it was found that 39% of patients had C-sections, 28% formula fed, and 29% were preterm.

SIGNIFICANCE OF PROJECT

This research addresses critical health disparities affecting Black mothers and infants, aiming to uncover root causes and potential solutions at the clinic. By comparing clinic data with statewide and national statistics, the study highlights the impact of culturally responsive care, advocating for broader adoption of similar healthcare models to promote health equity.

Gabino Guzman Losoya

Optimizing Cortical Neurosphere Culture for the Temperature-Controlled 3D Bio-Printing ofCustom Neural Tissue Models

Mentors: Boris Rubinsky, PhD; Maxwell Johnson

Hello! I'm an incoming transfer student at UC San Diego studying Molecular Cell Biology on a Pre-Med track. I am a first-generation student from a Mexican immigrant family, so it's no surprise that I've struggled in my pursuit of science within higher education. This year, I've come back to the program as a student mentor to guide my fellow students. Thanks to programs like the SSRP, I've realized I want to obtain an MD/PhD in Bio-Engineering to work as a physician-scientist focusing on creating equitable privilege-conscious biotherapeutics. This summer, I worked with the esteemed Rubinsky Lab at UC Berkeley focusing on stem cell research. I am grateful for this opportunity made possible by the UCSF SSRP. I would like to thank the SSRP staff, my mentors Dr. Boris Rubinsky and Maxwell Johnson, and the Hartnell MESA Program for their continued support and guidance throughout my clinical and scientific journey.

INTRODUCTION

Accurate in vitro models of neural systems are essential for furthering our understanding of neurological diseases and optimizing potential treatments. The Rubinsky Lab at UC Berkeley explores the creation of in vitro neural tissue models by combining cryopreservation and 3D bioprinting by incorporating neurospheres into their bio-ink. Neurospheres – three-dimensional clusters of neural stem cells – are cultured from mouse cortical stem cells in non-adherent conditions to form spheroids, promoting self-renewal and differentiation into the various neural cell types found within the brain region of interest.

OBJECTIVE

This study aims to optimize the culturing process of stem cell-derived cortical neurospheres for use in temperature-controlled 3D bioprinting to replicate the brain's complex architecture and functionality.

METHODS

Mouse cortical stem cells are thawed and plated in a 6-well culture plate, where they're fed warmed Epithelial Growth Factors (EGF) and Fibroblast Growth Factors (FGF) in Neural Stem Cell (NSC) Media for cellular expansion. The cells are cultured in an incubator at 37°C and are fed daily until the eighth day when the cells are passaged and split into two new wells, restarting the culture process from the beginning. The neurospheres are evaluated for specific morphometric features through both live and fixed immunofluorescent imaging throughout the culture process, as well as assessing functionality through protein and neurotransmitter concentration screening. Verified functional neurospheres are incorporated into our bio-ink and used in the lab's temperature-controlled 3D bioprinter for fabricating custom neural constructs.

ANTICIPATED RESULTS

Implementing neurospheres within the bio-ink for 3D printing will significantly enhance in vitro model accuracy, providing a more representative platform for studying neural development, diseases, and exploring potential therapies.

SIGNIFICANCE OF PROJECT

This approach offers promising applications in regenerative medicine, enabling the repair or replacement of damaged neural tissues, and enhances drug discovery by providing accurate platforms for high-throughput screening. This method addresses ethical concerns by reducing reliance on animal models and improving experimental reproducibility.

Nicole Ibarra-Barragan

Prevalence and clinical predictors of poor bone mineral density in our sickle cell disease population

Mentors: Madhav Vissa, MD; Pallavi Agarwal, MD

My name is Nicole Ibarra-Barragan, and I am entering my third year of nursing school at the University of San Francisco. My interest in healthcare began with myself, when I was diagnosed with a chronic illness at birth. Giving back to the community that has helped keep me healthy has always been one of my top goals, and I plan to do just that through the healthcare field. Growing up, I worked with different internships and organizations, both medically and education-focused, so that I would be able to better understand and analyze hardships that get in the way of people of color and health status. Direct patient care and being a part of someone's health journey is a priceless feeling that I have the privilege of experiencing every time I walk into a new patient's room. As I continue pursuing my bachelor's degree, my curiosity for disease processes and the disordered physiology happening in the body began to rise. This summer, I had the pleasure of working with Dr. Madhav Vissa and Dr. Pallavi Agarwal in the hematology department at the UCSF Benioff Children's Hospital in Oakland. I am eternally grateful for this opportunity made by the amazing SSRP team.

INTRODUCTION

Sickle cell anemia, or sickle cell disease (SCA/SCD) is an autosomal recessive disorder of the blood, where a single gene mutation results in malformed red blood cells. The sickled red blood cells are rigid and sticky with a tendency to break down easily. These cells constantly get stuck in small blood vessels that obstruct blood flow to the end organs, including bones. These frequent ischemic episodes tend to result in orthopedic complications including AVN, bone marrow necrosis, and bone infarcts.

OBJECTIVE

Exploring associations between low bone density and severity of sickle cell disease.

METHODS

We reviewed patients seen at BCH Oakland ages 0-25 with at least one DEXA scan performed between 2014-2023. History of fractures, chronic pain and transfusions, blood lab values, history of bone marrow transplant (BMT), and 4 types of disease-modifying therapies in SCD were considered. Individual patient factors, such as height, weight, age, sex, race, type of SCD, orthopedic complications, and baseline vitamin D and calcium were also collected. To assess severity, we collected data surrounding emergency department visits, evidence of organ injury, and followed the clinical severity scale outlined by Shah N et. al to categorize patients into mild, moderate, and severe categories. All the data was collected within 1 year before the most recent DEXA scan. Using GraphPad Prism and Excel software, I will create graphs to summarize the collected data.

ANTICIPATED RESULTS

182 patients met our criteria. We anticipate that the patients who have a more severe SCD will have more bone damage than those who have a less severe form of SCD.

SIGNIFICANCE OF PROJECT

Results of this study may shed light onto the relationship between bone health and clinical severity of SCD, which may include chronic pain and end organ damage. With further understanding of the clinical predictors of severe disease, we may begin to propose interventions that improve the morbidity and mortality in SCD.

Daviere Johnson-Burton

Prevalence of Bullying in Pediatric Orthopaedic Patients with Scoliosis and Foot/Ankle Conditions

Mentor: Coleen Sabatini, MD

Hello! My name is Daviere Johnson, I'm a senior at Berkeley high school. Some of my hobbies include working out, playing video games and sports. At Berkeley I am a part of the biotech partners program where they take 11th and 12th graders and teach them the skills they need to be successful in stem. I joined SSRP to continue to nourish my passion for Stem and learn what my true passion is before I go off to college. My interest in stem really started when I joined biotech and I learned how cool and fun science truly is. Being hands on all the time helped me explore my creative side. I am hoping to go to a four year university next year and I hope this internship will be the stepping stone that catapults me to the next level. I wanna thank Doctor Coleen for being an awesome leader and mentor over the course of this summer.

INTRODUCTION

The purpose of this study was to evaluate patients with scoliosis and those with foot/ankle conditions to assess if they are at higher risk of bullying than the general adolescent population.

METHODS

Anonymous surveys are being distributed to orthopaedic patients aged 10-17 and their parents to collect demographic data, responses to Adolescent Bullying Scale-9, and specific questions tailored to spine and foot/lower limb clinic patients. Results of patients who use orthopaedic devices will be compared to those without braces and parents' concerns about bullying. Statistical analysis will involve descriptive statistics and t-tests to compare results across different groups.

ANTICIPATED RESULTS

Data collection is ongoing, but an interim analysis of 57 patients revealed ethnically diverse cohort with 22 White (38.6%), 21 Latino (36.8%), 10 Asian/Pacific Islander (18%), 2 Black (3.5%) patients, mean age of 13.2 years. 36 patients with scoliosis (25 females (69.4%), 27.8% of which were in brace treatment at time of survey (27.8%) reported an overall prevalence of bullying attributed to their diagnosis of 6%. Analysis of all CABS-9 questions found no significant difference in bullying experiences between brace-wearing and no brace scoliosis patients. Twenty-one patients with foot/ankle conditions returned surveys, 47.61% of whom had worn/ were in, a brace; The overall prevalence of bullying attributable to diagnosis was 33%; with 62.5% of those in braces reporting bullying and 17% of those without brace. However, analysis of CABS-9 questions found no significant difference in bullying between them.

SIGNIFICANCE OF PROJECT

This study will help us to understand if children and adolescents are subject to higher rates of bullying if they have to use specific orthopaedic devices. The findings in this research study have an impact on how physicians understand the mental health of their patients, and could have an influence on the education and support they provide when prescribing orthopaedic braces.

Mina Khalil

Transfusion Dependent Thalassemia and Endocrinopathies in Adopted Children

Mentor: Ayca Erkin-Cakmak, MD

Hello! My name is Mina Khalil, and I am a rising sophomore at UC Berkeley studying public health. I am currently following the pre-med track, hoping to continue my studies in medical school and become a licensed physician. For as long as I can remember, I wanted to pursue only one medical specialty: obstetrics and gynecology. Through the SSRP program, I have had the opportunity to shadow a pediatric endocrinologist and conduct research on thalassemia. This experience has widened my perspective in a multitude of ways, exposing me to the intricacies of working with patients and teaching me the importance of exploring various specialties before committing to one. I'm deeply grateful to the program directors for selecting me for this incredible opportunity, as well as the supportive and uplifting intellectual community that composes the program's student body. Most of all, I am thankful for my mentor, Dr. Ayca Erkin-Cakmak, for constantly being there to answer my questions, encourage me, and provide me with the resources that I need to become an informed and conscientious physician in the future.

INTRODUCTION

Thalassemia is an inherited blood disorder that results from the deficiency or inadequacy of alpha or beta chains of hemoglobin (Hb), the oxygen conveying protein on RBCs that consists of both alpha and beta chains. There are two main forms of thalassemia: alpha and beta thalassemia. Alpha thalassemia is caused by deletions of alpha-globin genes, while beta thalassemia is due to point mutations in splice sites and promoter regions of the beta-globin gene.

OBJECTIVE

This descriptive observational study aims to test the hypothesis that adopted children with transfusion-dependent thalassemia will have a higher prevalence of endocrinopathies, such as hypogonadism, diabetes mellitus, short stature, hypothyroidism, and hypoparathyroidism, than children with transfusion-dependent thalassemia who live with their biological parents.

METHODS

The methods of the study include using the data obtained from stored medical records in REDCAP to study the prevalence of various endocrinopathies in adopted children with transfusion dependent thalassemia. We will perform analyses and graphical representation of the data with Stata, v17.1 (College Station, TX), setting a significance level of $\alpha = 0.05$ and implementing descriptive statistics to describe our patient population's characteristics. This study utilizes a sub-set of the data set from the Transfusion Related Endocrinopathies and Thalassemia (TREAT) study. Transfusion dependent patients with Thalassemia cared for at the Northern California Comprehensive Thalassemia Center between January 2000 and July 2021 were included in the study.

ANTICIPATED RESULTS

We anticipate a positive correlation between the prevalence of endocrinopathies and adopted patients with transfusion dependent thalassemia than those who live with their biological parents. We suspect that this discrepancy may be due to the thalassemia care they have received early on prior to adoption ultimately leading to a higher prevalence of endocrine disorders. Additionally, the data might reveal significant discrepancies in the rate of endocrinopathies due to the time of adoption. The adopted children may show a higher prevalence of endocrinopathies due to sub-optimal care they received prior to adoption.

SIGNIFICANCE OF PROJECT

This project aims to compare endocrine disorders in transfusion-dependent adopted children versus those raised by biological parents, enabling medical professionals to tailor care appropriately for adopted children.

Aimee Kiang

Identifying Correlations Among Lipoprotein Subfractions by Ion Mobility Analysis in the DIETFITS Weight Loss Study

Mentors: Sarah King, PhD; Ronald Krauss, MD

Hi there! My name is Aimee Kiang, a rising second year pursuing a master's degree in Nutritional Sciences and Dietetics at UC Berkeley. This first year in the master's program has been a pivotal experience in my career and has continued to shape my perspective on the intersection of science research and nutrition. From completing clinical rotations in Bay Area medical centers to extracting protein from liver tissue samples in my laboratory coursework, scientific research has been an indispensable part of my studies in nutrition. I am incredibly grateful for having the opportunity to work in the Krauss lab this summer to explore the metabolic processes of lipoproteins and observe how modulations in our diet can impact our health. This was an incredible learning experience for me, and I would like to give a big thank you to my mentors, Dr. Sarah King and Dr. Ronald Krauss, the SSRP staff, and all the wonderful scientists I had the privilege to work with in the Krauss lab during this time.

INTRODUCTION

Lipoproteins are complex biochemical macromolecules that facilitate lipid absorption, transportation, and metabolism. They consist of a soluble external lipid-protein shell, enclosing insoluble lipid contents, such as cholesterol and triglycerides. Synthesized from the liver or intestine, plasma lipoprotein particles become progressively denser as lipid content is delivered to target cells within the body. This results in a continuous spectrum of lipoprotein particles that can be classified into subclasses based on physicochemical properties, like density, size, and composition. Accordingly, major lipoprotein subclasses, such as, very-low-density lipoprotein (VLDL), intermediate-density lipoprotein (IDL), low-density lipoprotein (LDL), and high-density lipoprotein (HDL), can be further partitioned into narrower size intervals to display a heterogeneous distribution of lipoprotein subfractions, such as the midzone.

OBJECTIVE

We will assess the correlations between lipoprotein subfractions in the two diet interventions from the DIETFITS study.

METHODS

In this retrospective cohort study, we will be utilizing data from the 2016 DIETFITS study, a 12-month protocol that randomized participants to a healthy low-fat or low-carbohydrate diet. Plasma samples were analyzed by ion mobility, an electrospray process that obtains direct counts of lipoprotein particles as a function of particle size, to generate an ion mobility curve. Data from this curve will be extracted to produce a 1200-point dataset before importation into statistical software.

ANTICIPATED RESULTS

Using baseline data, we have replicated correlations previously observed between midzone size particles and IDL lipoprotein fractions. We hypothesize that BMI will correlate with these fractions. We will also investigate the effect of weight loss and dietary macronutrient intake on midzone particles.

SIGNIFICANCE OF PROJECT

Quantifying lipoprotein subfractions through ion mobility analysis is a promising method for assessing the effect of modulations in dietary macronutrient sources on individual lipoprotein profiles. Utilizing the 1200 point data, we can possibly generate smaller lipoprotein bin distributions that can provide additional information about cardiovascular disease risk. In turn, understanding the diagnostic and therapeutic implications of lipoprotein heterogeneity can be beneficial in establishing a healthy diet.

Isabella Lejano

Understanding Adverse Childhood Experiences in Adults with Sickle Cell Disease

Mentor: Marsha Treadwell, PhD
Contributing Author: Jessica Liang

Hello! My name is Isabella Lejano and I am entering my fourth year at UC Davis. I am majoring in Psychology and minoring in Human Development. Once I complete my undergraduate education, I hope to find a job within the field of healthcare. As the first person in my family to pursue a career in healthcare, I was keen to explore the field and gain as much experience as I can. The SSRP program has given me so many opportunities to explore the realm of science and research. During my time in the program, I was able to shadow and hear from multiple doctors at UCSF, and familiarize myself with the hospital and clinical setting. Before coming into the SSRP program, I did not view myself in the highest regard when it came to research and science. The mentors and leadership committee offered me nothing but support and encouragement. This program was challenging, but the experience and knowledge I gained over the summer was absolutely worth it. I would like to thank the organizers of this program and my mentor, Dr. Marsha Treadwell, for this amazing opportunity.

INTRODUCTION

Decades of research has produced strong evidence that adverse childhood experiences (ACEs - e.g., child abuse, neglect, other traumas) are associated with a high risk of poor physical and mental health outcomes in adulthood, with Black/African Americans reporting higher ACE exposures compared with other groups. There has been limited study of the impact of ACEs in sickle cell disease (SCD), a serious and complex condition that affects primarily Black/African American populations in the U.S.

HYPOTHESIS

We hypothesized that a higher proportion of adults with SCD will report 4 or more traditional ACEs compared with other populations, suggesting a high risk of toxic stress. We further expect that adults with SCD who report 4 or more traditional ACEs will experience more negative health outcomes such as depression and asthma.

METHODS

We conducted a secondary data analysis for participants with SCD recruited from a multi-site registry, that enrolled over 2400 adolescents and adults. 548 participants were recruited in 2018 - 19 to complete follow-up surveys and an ACEs Questionnaire that assessed experiences with the original 10 ACEs and 9 additional stressors (e.g., bullying, medical traumas, neighborhood violence and discrimination). Participants reported only the number of ACEs experienced, without revealing specifics.

ANTICIPATED RESULTS

Study participants had a mean age of 27.7 years (SD = 7.8); and were mostly female gender (57.3%); Black/African American race (94.6%); annual income less than $25,000 (55%); and sickle cell anemia diagnosis (69.3%). 70.3% reported 1 or more traditional ACEs, with 28.1% reporting 4 or more ACEs (compared with 16% of adults in the general population and 24% of Black/African American adults). In multivariable analyses controlling for demographic and clinical characteristics, compared with those with 0 ACEs, participants reporting 4 or more ACEs had 2.5 times greater odds of being treated for asthma (95% CI 1.52 – 4.22, $p < .001$) and 4.8 greater odds of being treated for depression (95% CI 2.65 – 9.08, $p < .001$).

SIGNIFICANCE OF PROJECT

Our hypotheses were supported, and understanding relationships between ACEs and outcomes in SCD can ultimately help us to create effective interventions to address the challenges that these populations might face.

Adriana Medina

Investigating the effect of antipsychotic drug Pimozide on Hippo signaling and STAT3 pathway in Hepatic Fibrosis

Mentor: Jennifer Chen, MD & Department of Hepatology

Hello! My name is Adriana Medina, and I am a rising second-year molecular and cellular biology major at the University of California, San Diego. Two years ago, I had the opportunity to participate in this program, during which I researched the inflammatory response which the body generates in response to malaria in the placenta. This experience affirmed my love for science and interest in research, and instilled my passion for reproductive sciences which I hope to pursue in my career future. I am thrilled to be back at UCSF this summer as an alumni and peer mentor, researching a completely different project focused on repurposing antipsychotic drugs as therapeutics for liver disease. I hope to broaden my understanding of research processes, while also strengthening my mentorship and presentation skills. I would like to express my sincere gratitude to my mentors Dr. Jennifer Chen and Vijay Prathigudupu, as well as the SSRP leadership for their endless support and incredible patience.

INTRODUCTION

Fibrosis is the final common pathway leading to end-stage liver disease, and is characterized by accumulation of extracellular matrix proteins. Hepatic stellate cells (HSCs) are the primary cell type which are responsible for liver fibrosis because they are key producers of extracellular matrix proteins. Specific factors can promote HSC activation, including the Yes-associated protein/transcriptional coactivator with PDZ-binding motif (YAP/TAZ). Activation of YAP/TAZ has been shown to promote fibrosis in multiple organs and the selective targeting of YAP/TAZ has reduced fibrosis. Another important factor is STAT3, whose inhibition has been previously shown to induce apoptosis in HSCs, and mice lacking STAT3 in HSCs were less susceptible to fibrosis. Inhibiting STAT3 in active HSCs would provide a new avenue to inactivate HSCs and promote fibrosis regression. We have determined that Pimozide (PMZ) works to inactivate HSCs, however the mechanism through which PMZ works has not been elucidated.

HYPOTHESIS

We hypothesize that STAT3 is upstream of and in the same signaling pathway as YAP/TAZ, and both are modulated by PMZ, which ultimately results in the reduction of fibrosis in the liver.

METHODS

We will treat human HSCs with either Vehicle or Pimozide to determine whether STAT3 or YAP/TAZ phosphorylation is impacted by PMZ first. These experiments will be visualized using Western Blots. We will also perform a time-course experiment of pimozide-treated HSCs to measure STAT3 and YAP/TAZ nuclear localization by immunofluorescence.

ANTICIPATED RESULTS

Our results so far have revealed that at time intervals of 24hrs, 6hrs, and 3hrs, both YAP/TAZ and STAT3 are inactivated. We anticipate that pimozide inactivates STAT3 prior to YAP/TAZ.

SIGNIFICANCE OF PROJECT

We wish to understand the signaling mechanism of PMZ that enables it to inactivate HSCs in the liver. Our study will determine how STAT3 and YAP/TAZ are affected by PMZ and if they are part of the same signaling sequence which promotes fibrosis. The data from our study will provide us valuable insight into mechanisms that can be targeted in the future for therapeutic purposes.

Aye Chan Moe (Rue)

Identifying the Critical Region of LDLR mRNA for CSDE1 Binding

Mentors: John Chorba, MD; Him Visitvoranat, BS

Hi! My name is Aye Chan Moe. I am a second-year student at Skyline College, studying cognitive science with a minor in psychology. I migrated from Myanmar in 2022 due to the military coup, and this experience inspired me to pursue a career as a scientist. This summer, I am excited to be part of the John Chorba lab for SSRP 2024, where we work on detecting and developing sensors for LDL receptors related to coronary heart disease. I am incredibly grateful for the support and encouragement from everyone in the lab and the SSRP program. They have helped me overcome my imposter syndrome and made me feel truly welcomed. The resources and guidance provided by the lab members and SSRP staff have been invaluable for my career development, and I am deeply thankful for this opportunity.

INTRODUCTION

Coronary heart disease is a leading cause of death globally, largely due to high levels of low-density lipoprotein (LDL) cholesterol. Current treatment strategies to lower LDL levels include drugs such as statins, which suppress cholesterol synthesis, and PCSK9 inhibitors, which enhance LDL clearance via the LDL receptor (LDLR) pathway. Lowering LDL levels is crucial because high LDL levels in the bloodstream over a long period can lead to plaque buildup in arteries, increasing the risk of heart attacks and strokes. Our research examines the role of CSDE1 in LDL receptor (LDLR) mRNA degradation. By identifying specific LDLR mRNA regions that bind to CSDE1, we aim to uncover new regulatory mechanisms of LDLR mRNA stability.

HYPOTHESIS

We hypothesize that only the 3’ UTR of the LDLR mRNA is necessary for CSDE1 binding. In order to achieve this goal, we must first create plasmid constructs that, once undergone transcription, produce mRNAs that are missing either the coding sequenceor the 3’ UTR.

METHODS

We aim to generate and validate three distinct LDLR constructs using cloning and Gibson Assembly: pIVT-5’UTR-LDLR-3’UTR, pIVT-5’UTR-LDLR, and pIVT-5’UTR-3’UTR. For each construct, we will transform them into competent BL21 (DE3) E. coli cells. Following transformation, we will then purify the plasmids from the E. coli using the Miniprep method and submit them for sequencing to confirm the accuracy of the constructs.

ANTICIPATED RESULTS

We expect that we will be able to successfully produce the 3 plasmid contracts with the primers and availiable templates using PCR and Gibson assembly.

SIGNIFICANCE OF PROJECT

This project aims to uncover novel mechanisms regulating LDLR mRNA stability, specifically through CSDE1-mediated degradation. Such insights might lead to the development of new therapeutic strategies targeting CSDE1, offering alternative or supplementary treatments to existing therapies. Ultimately, this could contribute to more effective interventions for hypercholesterolemia and coronary heart disease, reducing morbidity and mortality associated with these conditions.

Nghi Nham

iPSC phenotypes after reversion of SUGP1 rs10401969 SNP

Mentor: Shahrbanoo Kashavarz, PhD
Contributing Author: Aras N. Mattis, MD, PhD

Hello! My name is Nghi Nham and I will be going into my senior year at Abraham Lincoln High School in the fall. I am interested in majoring in Microbiology in college to pursue a career in Nursing after. Having been born in Vietnam I was always surrounded by illnesses in family, friends, and myself. I had a myriad of questions but there were never enough answers. As I transitioned to life in San Francisco, I entered high school with a curiosity about how scientists were able to research and advance the world of science and our knowledge of diseases, treatments, and cures. Wanting to experience and learn about what it means to be a scientist, I decided to apply to SSRP at UCSF after an introduction from my Biotechnology teacher. This summer, I will be working with my mentor, Dr. Keshavarz on a project using Stem Cells to research the gene, SUGP1, in the liver. Finally, I would like to thank my mentor, as well as Dr. Mattis, Dr. Mehraban, Luis, and all of my peers in the Mattis Lab. I am eternally grateful to you all and for aiding me in furthering my passion for science.

INTRODUCTION

Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD) is a dynamic liver condition ranging from simple hepatic lipid accumulation to Metabolic Dysfunction-Associated Steatohepatitis (MASH), which can progress to liver fibrosis and cirrhosis. MASLD affects over 30% of adults worldwide and is initiated by excess hepatic lipid accumulation. Previous research demonstrated a strong linkage between genetic variants within the chromosome and excess lipid accumulation within hepatocytes which characterized the SUGP1 gene as a regulator of cholesterol metabolism. Furthermore, in recent *in vitro* studies, iPSCs derived Hepatocytes (iHeps) with SUGP1 knockout significantly increased lipid accumulation within cells especially when challenged with Sodium Oleate.

HYPOTHESIS

We aim to analyze phenotypes within induced Pluripotent Stem Cell (iPSC) patient cell lines after the reversion of the SUGP1 rs10401969 SNP (Single Nucleotide Polymorphism).

METHODS

MASH patient cell lines with the SUGP1 SNP were corrected by CRISPR-Cas9 double-strand cut and corrected template-driven repair. Processes of cell expansion, sorting, screening and colony detection were performed on batch corrected SUGP1 corrected library lines. Cloned cells were confirmed to be homozygous through Sanger sequencing and will be expanded in six-well plates and then transferred to 24-well plates for testing. Three cell lines will be analyzed in vitro: MASH-carrier iPSC lines, non-MASH iPSC line control(s), and SUGP1 clone corrected SNP iPSC lines. Each cell line will be challenged with Sodium oleate (lipids), and plates will be fixed with 4% PFA and stained with Nile-Red and Hoechst nuclear stain. Lipid accumulation will be quantified through imaging after 24 hours and quantified using Cytation 5 imaging and Prism-GraphPad software analysis.

ANTICIPATED RESULTS

Phenotypes of iPSC corrected SUGP1 SNP cell lines will have an expected decrease in lipid accumulation within the cell similar to the healthy iPSC line when compared to the 7017 MASH-containing iPSC line.

SIGNIFICANCE OF PROJECT

This is pioneering research for the greater knowledge interrogating the functions of the SUGP1 gene and the effects it has on cellular models of MASLD. Furthermore, this research will establish if SUGP1 is a therapeutic target for patients with MASLD.

Mercy Niyi-Awolesi

Optimizing a CRISPR-Mediated, Non-Viral Knock-in Approach in Hematopoietic Stem Cells

Mentors: Jenny Lee; Ke Li, PhD; Brian Shy, MD, PhD

Hello! My name is Mercy Niyi-Awolesi, I am a rising freshman at Dartmouth College. Growing up, I have always been fascinated by science and the human body. This passion coupled with my extensive experience caring for my younger siblings and cousins, among other past experiences sparked my interest in becoming a pediatrician that also works within public health. My overall goal in all my endeavors is to address health disparities in Black, immigrant, and lower income communities. I am grateful for SSRP, which has given me the opportunity to explore scientific research, learn a lot about various science fields, as well as learn about health disparities and work that is being done to promote health equity. This summer, I am privileged to work with my amazing mentors, Jenny Lee and Dr. Brian Shy to conduct stem cell research focused on optimizing a non-viral knock-in approach to gene editing in HSCs.

INTRODUCTION

Originally adapted from bacterial defense systems that cleave foreign DNA, Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) has been repurposed as a gene editing tool. Shy et al. have developed a CRISPR-Cas9 engineering approach using modified single-stranded DNA (ssDNA) repair templates that allows us to eliminate the use of viruses within our manufacturing process while maintaining high knock-in efficiencies and yields.

OBJECTIVE

To identify optimal conditions for clinically compatible, non-viral knock-in in HSC populations by optimizing the following 3 components: safe harbor targets, pulse codes, and HDRT concentration.

METHODS

Cryopreserved CD34+ cells were thawed and expanded for four days before editing. Cells were electroporated on Maxcyte GTx with Cas9, gRNAs targeting genetic safe harbor sites, and an HDRT encoding mCherry. Edited cells were expanded for 5 days before samples were taken for counts and flow cytometry to measure fold expansion, toxicity, knock-in percentage and yield of mCherry+ cells.

ANTICIPATED RESULTS

Between the safe harbor targets, the AAVS1 site showed higher knock-in rates than GS94. An increase in pulse code energy levels (HSC 3 to 5) also led to an increase in knock-in rates and toxicity, leading to a comparable number of cells with knock-in in all three pulse codes tested. Additionally, increasing the HDRT concentration also increased our knock-in rates as expected. However, our highest amount of HDRT (2 pmol) seemed to lead to higher levels of toxicity when also using higher pulse code energy levels.

SIGNIFICANCE OF PROJECT

Many inborn errors of immunity (IEI) disorders, such as Severe Combined Immunodeficiency, could be treated with targeted HSC engineering approaches. Our work to optimize the non-viral engineering platform in HSC populations would help lay the foundation for further development of clinical products to treat IEI that are caused by loss-of-function mutations.

Gracie Osborne

Racial/Ethnic, and Sex Disparities in Deep Brain Stimulation Therapy for Parkinson's Disease

Mentor: Stephanie Sandoval-Pistorius, MS, PhD
Contributing Authors: Skyler Deutsch; Melanie Morrison, PhD

Hi! I'm Gracie Osborne. I am an incoming UC Berkeley junior pursuing a Public Health major and a Data Science Minor. Since I was a kid, I have always known I wanted to do something in health based on my pure joy for human physiology and being able to use that knowledge to help others. However, I realize that health extends beyond physiological and chemical factors to environmental and external factors. Now, I am preparing myself to be a physician who can understand the fullness of my patients' intersectional experiences to meet their personalized needs. I am beyond grateful to Dr. Stephanie Sandoval-Pistorius for her tailored mentorship, genuine kindness, and openness to my learning progress. Thanks to SSRP for this opportunity. This program has sharpened my analytical skills and public health knowledge regarding health disparities. Everything I gained from this program will make me a culturally sensitive and data-oriented clinician.

INTRODUCTION

Parkinson's Disease (PD) is the second most common neurodegenerative disease. Deep brain stimulation (DBS) is a surgical therapy for advanced PD; next-generation DBS systems can sense brain activity, such as local field potentials, opening the door for further research and advances in DBS applications. The limited research on the inequities in DBS care suggests disparities in access to DBS. To identify areas for improvement, we must identify and understand potential disparities in DBS care.

HYPOTHESIS

I expect that racial/ethnic, and sex disparities exist in the type of devices individuals receive (sensing vs non-sensing) and disease duration at the time of DBS surgery.

METHODS

Using a previously curated dataset, we analyzed data on the disease duration at surgery, pre-DBS PD severity, and DBS device type implanted for up to 482 individuals implanted at UCSF. Using Python and R-Studio, we conducted statistical analyses to identify potential differences between racial/ethnic identities and sex for the three focus areas.

ANTICIPATED RESULTS

Preliminary observations support the presence of racial/ethnic and sex differences within DBS care in our study cohort. 6-12 months after DBS surgery, the data show a trend toward white individuals experiencing more improvement than other ethnic/racial groups. Analyses assessing years since diagnosis may suggest that Asian individuals may have longer disease duration at the time of surgery. Initial observations of device type implanted suggest that women may receive non-sensing-enabled devices more often, while men may receive sensing-enabled devices more often.

SIGNIFICANCE OF PROJECT

This study begins to explore potential racial/ethnic and sex disparities in DBS care at UCSF. Large differences in sample size limit our ability to make conclusive statements of our findings, but trends support the presence of potential areas of inequity. Larger and more diverse study cohorts are needed to further identify areas for improvement. Disparities in PD severity, duration, and post-DBS improvement may elucidate potential biases in referrals for DBS and disparities in access to experts in DBS programming.

Belem Osorio

Measuring Protein Markers to Quantify Differentiation efficiency of Induced Pluripotent Stem Cells (iPSCs) into iPSC-Derived Pancreatic β-Like Cells (iPSC-β Cells)

Mentors: Yuqing Zhang, PhD; Marisa Medina, PhD

Hi! My name is Belem Osorio, and I am a rising freshman at UC San Diego majoring in Cognitive and Behavioral Neuroscience. I am still debating between the Pre-Med or PhD track but only time will tell! For most of my life I thought I was going to be a vet, but it wasn't until I developed an eating disorder between 8th-11th grade that I became intrigued about my brain chemistry. As a first-generation Mexican-American, I want to assist underrepresented communities and reduce the stigma towards neurological disorders. Alongside my journey, I've collaborated with Brain Camp at UCSF and Illumina, Inc., bringing awareness to EDs. I am extremely grateful for SSRP and my mentors, Dr. Marisa Medina and Dr. Yuqing Zhang who have provided me with long-lasting research experience on iPSCs, serving as one of my stepping stones towards my future career and ambitions.

INTRODUCTION

Statins are a class of drugs used to lower cholesterol and reduce risk of cardiovascular disease, however, in some individuals statins can cause new-onset type 2 diabetes (NOD). Statin treatment has been shown to inhibit secretion of insulin from pancreatic β-cells, an important pathway for maintaining glucose control. The Medina lab has created a repository of iPSCs from individuals who developed statin induced NOD and those who did not (controls). Differentiating these cells into iPSC-derived pancreatic-β-cells (iPSC-β cells) is important to understand why some people are susceptible to statin-induced NOD. Such studies require that iPSC-β cells can be created equally well from donors with or without NOD.

HYPOTHESIS

Patient-derived iPSCs from donors with statin-induced NOD will have a lower efficiency of differentiating into iPSC-β cells compared to iPSCs from controls.

METHODS

iPSCs are seeded into Matrigel-coated plates, cultured in mTeSRI medium, and a 35-day differentiation process is started once they reach 90% confluency. During the differentiation process, cells will be sampled at day 0 (iPSC) to quantify markers of pluripotency (TRA-1-60 and Oct-4), day 7 to quantify endoderm markers (SOX17), day 14 to measure pancreatic progenitors markers (NKX6.1), and day 25 to measure iBeta endocrine markers (NKX6.1 and C-peptide). Cells will be fixed in 4% paraformaldehyde, and markers will be measured by flow cytometry.

ANTICIPATED RESULTS

iPSC-β from NOD cases will have a lower level of C-peptide and NKX6.1 double positive cells compared to iPSC-β from controls.

SIGNIFICANCE OF PROJECT

It is not clear yet why some statin users develop NOD, while others don't. By studying iPSC β cells from donors with statin-induced NOD vs. statin users who maintained normal glucose control, the Medina lab hopes to discover genes or pathways that can serve as markers to identify who might be most at risk for developing this adverse effect.

Nicole Padilla Alvarado

Live Imaging of Fluorescent Tagged MFSD2A, an Important Protein for Placental cell-cell Fusion

Mentor: Meagan Esbin, PhD

Hiiii- My name is Nicole I'm a rising senior at Berkeley High school. Some of my hobbies include hanging out with my friends, shopping, and volunteering at the Berkeley Food Bank. I am currently working in a lab at Uc Berkeley. At my school I am part of a program called Biotechnology Academy which helps underrepresented first generation 11th and 12th graders find their passion for science. I joined SSRP to be able to expand my knowledge on science related career opportunities. My interest for science sparked in the beginning of my junior year when biotech introduced me to a lab environment and how lab materials are used. This Internship seemed perfect since I had some experience in lab. I'm hoping to attend a four year college and major in biology or biochemistry. I want to thank my mentor Dr. Esbin for being so patient, kind and welcoming.#BEST MENTOR

INTRODUCTION

During pregnancy the growing fetus grows an extra organ called the placenta, which is able to interchange nutrition and waste between the fetus and mother. The growth of the placenta requires a special cell that needs to fuse with other cells that form a syncytium. To form the syncytium there are two important cell membrane proteins called MFSD2A and Syncytin 2. Syncytin2 initiates fusion while MFSD2A is a receptor. While we know that MFSD2A and Syncytin 2 bind together during cell-cell fusion we don't know the timing and location when the two proteins bind together.

OBJECTIVE

We want to create fluorescently tagged MFSD2A constructs by using bacterial cloning. Then we will test if combining the cells with cell-cell fusion in live human cells will work using our engineered MFSD2A. The next step would be to see where and how MFSD2A and Syncytin 2 bind together.

METHODS

Clone 5 tags of MFSD2A using tags like Halo-3XFLAG, SNAPf-V5, and mScarlet,through SnapGene using gibson assembly. We will use gibson assembly to assemble the backbone of a plasmid and our designated MFSD2A tag and then we will purify them from bacteria.We have two cell lines that are GFP (1-10) and GFP 11. The reason we have two cell lines is because GFP (1-10) has a mutation where it's missing a piece and GFP 11 is that piece. Once we add the MFSD2A and Syncytin 2 protein into the human cells, if we see fluorescence that would indicate that the cells fused and therefore Syncytin2 and the tagged MFSD2A worked.

SIGNIFICANCE OF PROJECT

In pregnancy diseases like preeclampsia we see a correlation that women with pregnancy diseases have less cell-cell fusion in the placenta. The significance is that we want to learn how cell-cell fusion works in order to understand why pregnancy diseases happen.

Talisha Pereira

Barriers to Zinc Assessment in Patients with Sickle Cell Disease

Mentor: Ellen Fung, PhD

Hello, my name is Talisha Pereira and I am a recent graduate from University of San Francisco with a B.A. in Psychology and a minor in African American Studies. I knew since very young that I wanted to pursue a career in the medical field. Throughout my journey, I have participated in various opportunities that deepened my passion to help others in a medical setting. These include volunteering at nearby hospitals, shadowing in the offices of various specialties, working as a medical scribe in the emergency department, working as a pharmacy technician, and currently going to school to acquire my phlebotomy certification. The one aspect I was missing was research. The SSRP program has allowed me to submerse myself in the latter and see how science and research works by implementing practices and techniques in efforts to answering a scientific inquiry. I am so grateful for the knowledge and support I have received through this program. During this program I have been able to push myself in various life skills. One very important one was time management, in which I have balanced working multiple jobs, summer school, and commuting to this wonderful program in Oakland from Sacramento. I am very thankful for the organizers of this program and my mentor, Dr. Ellen Fung, for providing me with this enriching experience.

INTRODUCTION

Sickle cell disease (SCD) is an inherited autosomal recessive disease caused by a single point mutation in the gene that encodes for hemoglobin. Over 4 decades of research have shown that patients with SCD are at risk for zinc deficiency. Zinc supplementation has been shown to improve growth and immune function, leg ulcer healing and results in less pain episodes, the hallmark of SCD morbidity. Despite this robust literature on the relationship between zinc deficiency and poor outcomes in SCD, the translation of this knowledge to the practicing hematologist is limited. Anecdotal evidence suggests that clinicians rarely assess zinc status in patients with SCD, yet the reasons for the disconnect between the published literature and clinical practice are unclear.

HYPOTHESIS

Patients with sickle cell disease (SCD) are at risk for zinc deficiency, yet rarely receive adequate assessment.

METHODS

This project has 2 parts: 1) to document the rate of zinc assessment in patients with SCD at UCSF using a retrospective, de-identified chart review in patients with SCD (cases) compared with patients with another hemoglobinopathy, thalassemia (controls). ICD-10 codes will be used to abstract information on serum zinc, as well as comorbidities related to zinc deficiency. 2) to explore the possible barriers to zinc assessment using a survey distributed to local hematologists to inquire about the likelihood of ordering a serum zinc and possible barriers in doing so.

PRELIMINARY RESULTS

386 patients with SCD were seen at UCSF, 16.8% had zinc assessed and 44.6% categorized with zinc deficiency. This is compared to 245 Thal, 38.8% zinc assessed and 32.6% zinc deficient. Patients with Thal are twice as likely to be assessed for zinc, with lower rates of deficiency. Survey results are pending. We anticipate finding both intrinsic (e.g. lack of knowledge regarding the importance of zinc) as well as extrinsic factors (e.g. a patient's insurance provider) may influence a hematologist's decision making regarding when to order a serum zinc in a patient with SCD.

SIGNIFICANCE OF PROJECT

By bringing attention to this critical healthcare issue, it will increase awareness which may lead to a correction of zinc deficiency and improvement in overall care for at-risk patients with SCD.

Vy Phan

Validation of Induced Pluripotent Stem Cell Differentiation into iPSC-Hepatocytes Using Stage-Specific Cell Markers

Mentors: Yuanyuan Qin, PhD; Marisa Medina, PhD

Hello! My name is Vy Phan. I am a rising senior at Holy Names High School in Oakland and am a part of the class of 2025. Growing up, I always knew I wanted to do something related to medicine or law. Outside of school, I enjoy hanging out with family and friends, often cooking for them when I have time. During my weekend volunteering at St. Vincent De Paul, I realized that besides medicine, I also wanted a career where I could help and care for others. The SSRP Program was the perfect opportunity for me to continue my science journey. Before this program, I never knew about induced pluripotent stem cells or their importance. Interning at Medina Lab allowed me to gain first-time lab experience, such as pipetting and how cell culturing. I am excited to participate in this program and cannot thank Dr. Yuanyuan Qin and Dr. Marisa Medina enough. I am grateful to Medina Lab and its members, who not only taught me about induced pluripotent stem cells but guided me to a better understanding of how research is done.

INTRODUCTION

Induced pluripotent stem cells (iPSCs) are created by reprogramming somatic cells to generate patient-specific cell lines. iPSCs can be differentiated into disease-relevant cell types, such as iPSC-derived hepatocyte-like cells (iPSC-Heps), which may be used to model individual-level risk for metabolic dysfunction-associated steatotic liver disease (MASLD). iPSC-Heps are created by differentiating iPSCs into the endoderm, then hepatic progenitor cells, and finally iPSC-Heps. Since differentiation efficiency varies across iPSCs of different donors, it is important to validate this process using the expression of cell-type-specific markers and measurement of cell-type-specific functions.

OBJECTIVE

Detect iPSC differentiation efficiency into iPSC-Hep by quantifying specific cell stage markers and measuring albumin secreted into the media.

METHODS

iPSCs will be cultured in mTESR1 media at 37° with 5% CO2. iPSCs will be differentiated into iPSC-Heps using a 21-day directed process with various growth factors and small molecules. Flow cytometry will measure markers of pluripotency (OCT 3/4 and TRA-1-60), endoderm (SOX17 and FOXA2), pre-hepatocyte (HNF4α and AFP), and mature hepatocyte (ALB and ASGPR). ELISA will be utilized to measure albumin secretion in the medium. Through flow cytometry, cells stained with fluorescence-labeled markers will be suspended in a liquid stream and passed through a laser light, the detectors will record light emitted from the passing cells to determine the cell type.

ANTICIPATED RESULTS

As the iPSCs differentiate into iPSC-Heps, each stage will exhibit its corresponding markers. We anticipate observing Oct 3/4 and TRA-1-60 in the pluripotency stage, SOX17 and FOXA2 in the endoderm stage, HNF4α and AFP in the pre-hepatocyte stage, and ALB and ASGPR in the hepatocyte stage. Albumin will be detected in the iHep media.

SIGNIFICANCE OF PROJECT

iPSC-Heps can model diseases using individuals' samples to demonstrate disease risks and compose a prevention plan. Monitoring the differentiation process and validating iPSC-Heps' markers will allow further studies to be conducted on addressing human liver malfunction.

Sofia Ramos

Black Joyful Parenting: The Development of a Culturally Grounded Parent Program to Promote Early Relational Healt

Mentor: Baylee DeCastro, MPP

Hi! My name is Sofia Ramos and I am a rising senior at Holy Names High School. My interest in science and the medical field started early. Throughout my childhood, I accompanied my Spanish-speaking parents to their appointments, translating their needs to doctors and their advice back, even when I could barely understand what parts of the body or symptoms they were describing. I often found myself lost in translations and left sketching out diagrams of shoulder pain or back aches that looked more like supernatural farm animals. Because the scientific and medical fields were such unknown areas to me as a child, I was inspired to learn more about them to help my family understand them further and receive the adequate help they needed. The UCSF Summer Student Research Program has allowed me to delve further into my interests within the scientific field and define my career goals. By collaborating with my mentor and peers, I developed my leadership and collaborative skills and experienced research at a professional level. I'm extremely thankful for the opportunities this program has granted me and for my mentor, Dr. Decastro, for providing me with an enriching research experience.

INTRODUCTION

Research shows that Adverse Childhood Experiences (ACEs) can lead to toxic stress and poor health outcomes. Safe and supportive relationships with trusted adults can prevent or reverse these effects. Based in pediatric primary care, the Resilience Clinic (RC) is an evidence-informed parent-child psychoeducation group providing mindfulness education, stress management tools and peer support for parents and caregivers with children zero to five to prevent toxic stress and build resilience. Findings from RC replication efforts and best practices in academic literature underscore the importance of cultural adaptation. In alignment with these findings, the BLOOM Clinic created Black Joyful Parenting (BJP), a parent group developed and implemented for and with Black identified families.

OBJECTIVE

This study aims to document the process of BJP development, identify promising practices for cultural adaptation, and make recommendations for further study.

METHODS

Through a literature review, key informant interviews, thematic analysis and process mapping, the study will investigate how the intervention was culturally adapted and identify opportunities for future research.

ANTICIPATED RESULTS

Developing a flexible, iterative intervention with the cultural norms, values, experiences, and feedback from participants as well as framing an intervention's goals in a culturally consonant way will improve program engagement and participant satisfaction.

SIGNIFICANCE OF PROJECT

For Black parents and caregivers of young children, structural racism and experiences of discrimination can negatively impact health outcomes. Documentation of the process of culturally adapting an evidence-informed intervention through BJP can help further support future research towards developing culturally responsive care for Black families.

Shea Stubblefield

Immunoprofiling across the lifespan of female BALB/c mice

Mentors: Tina Akbarzadeh, PharmD; Mary Helen Barcellos-Hoff, PhD

My name is Shea Stubblefield, and I'm entering my third year at UC Berkeley as a biology major with a music minor. I grew up filled with endless questions about the world around me, and this curiosity is what guides my present-day nerdiness and unending passion to infect others with a love of science. In the future, I hope to build safe spaces for patients to ask questions and take agency over their health and wellbeing as an OB/GYN. I'm excited to integrate all that I've learned into conducting cancer research at the Barcellos-Hoff lab this summer and share the insight I gain with the aspiring scientists around me. I'm incredibly grateful to Dr. Barcellos-Hoff, Tina, William, and everyone else in the lab, at SSRP, and in my community who has believed in me and invested in my success. My work this summer (and my first paycheck) is dedicated to my Tiya Amy, a breast cancer survivor who nurtured me into the person I am today. Maraming salamat Tiya, at mahal kita.

INTRODUCTION

A growing body of work suggests aging is a systemic process mediated by circulating factors with immunosuppressive effects, contributing to a decline in immune system capabilities. Inflammaging is the concept that chronic inflammation leads to increased immunosuppression in aging individuals, putting them at higher risk of infections, cancer, and autoimmune disorders. We postulate that ionizing radiation exposure, a known carcinogen, may accelerate aging by inducing an inflammatory response.

OBJECTIVE

To identify age-related changes in the immune system by immunoprofiling spleen.

METHODS

Mature (24 week-old) female BALB/C mice were sham-irradiated or low-dose irradiated (50 cGy) before transplantation with Trp53 null epithelium. Half the mice were given low-dose aspirin via drinking water for 6 months. All mice were monitored by palpation, and a subset were sacrificed at 4 and 8 months to collect samples. The remaining mice were monitored until tumor formation or termination at 18 months post-transplantation.

Spleen samples taken from 66 tumor-free mice at 4, 8, and 18 months post-treatment were immunostained with a panel of immune cell markers and analyzed using multispectral flow cytometry.

Different cell populations were distinguished based on immune cell lineage markers through FCS Express gating. Clustered heatmaps were generated using SRplot.

ANTICIPATED RESULTS

Unsupervised clustering was used to generate a heatmap of the relative abundance of different cells in the spleen. Age was the most marked association with the pattern of immune profiles, rather than treatment group. The youngest mice (10 months) had more lymphoid cells than middle-aged (14-months) and old (24 months) mice, suggesting that composition changes may underlie the decline in immune system function with age. Interestingly, old mice had the highest number of double-negative and natural killer T cells, reflected in peripheral blood mononuclear cells analyzed in these mice in prior studies. These data suggest that different tissues maintain similar immune profiles to one another.

SIGNIFICANCE OF PROJECT

Our experimental studies in mice provide insight into the complex interactions between the immune cell compartments, which may be associated with disease in humans.

Ari Taubenfeld

Assessing *CDKN2A* and *TP53* Knockout Cells and Changes Post Butyrate Exposure

Mentor: Mathew Stachler, MD, PhD

Hi! My name is Ari Taubenfeld, and I'm a rising third-year student at Pomona College in Claremont, California. I am majoring in Neuroscience with a minor in Chemistry while following the Pre-Health track. Although I wasn't always drawn to STEM subjects, my interest in helping people and love for hands-on learning experiences from a young age naturally led me to science and medicine. Initially, the transition to college made me question my place in these fields, but an invaluable recent experience in which I shadowed a surgeon and anesthesiologist during surgery reaffirmed my passion for pursuing a career in medicine. In the future, I aspire to build a career focused on promoting accessibility, service excellence, and diversity, especially for marginalized and disproportionately affected populations. I would like to express my heartfelt gratitude to the Stachler lab and the SSRP programming staff for their incredible support and the amazing opportunity they provided me this summer. Their dedication and guidance have been instrumental in my academic journey.

INTRODUCTION

Barrett's Esophagus (BE) is the precancerous condition to esophageal adenocarcinoma (EAC), a tumor whose frequency has seen a dramatic increase in incidence. Metaplastic BE can form due to chronic gastroesophageal reflux (GERD). These cells can then progress to dysplasia and cancer. The process or what specifically induces this is not well understood.

OBJECTIVES

1. To knockout genes *TP53* or *CDKN2A* (common alterations in EAC) from BE cells and determine the effects on cell growth and genomic evolution.

2. To determine the effects of butyrate on BE cell progression (with and without gene knockout).

METHODS

We will knockout the selected gene by exposing cells to lenti-viral vectors carrying Cas9, guide RNA (to either *TP53* or *CDKN2A*), and selection marker. We will confirm the KO through either PCR or sequencing. We will then determine any changes in the growth characteristics of the knockouts compared to a control with the gene intact.

We will expose wild type and *TP53*-KO cells to either a control or butyrate (produced by gut microbiota and possibly a component of GERD). We will then determine changes in cell proliferation or histologic progression toward dysplasia. We will sequence the cells +/- butyrate exposure to determine the extent of accumulated genomic alterations.

ANTICIPATED RESULTS

We hypothesize that loss of *CDKN2A* may lead to increased proliferation and loss of *TP53* will lead to the accumulation of other genomic alterations (cell aneuploidy). As these genes are classified as tumor suppressors, the KO will help drive progression toward cancer. Butyrate, a naturally formed chemical in the large intestine, can induce cancer in other settings by promoting epithelial proliferation. We hypothesize after loss of *CDKN2A* we will see a greater increase in proliferation compared to wild type BE cells.

SIGNIFICANCE OF PROJECT

With this research, we hope to gain insight into which aspects of GERD may contribute to driving metaplastic BE into dysplasia and eventually EAC. It is hoped a better understanding of this process can lead to better biomarkers and preventative treatments.

Jason Tesfa

Evaluating the Experiences of Families in Pediatric Primary Care at the Black Love Opportunity & Outcome Improvement in Medicine (BLOOM) Clinic

Mentors: Akua Agyekum; Cherri Harris, LVN; Dayna Long, MD

Hello! My name is Jason Tesfa and I am a rising junior at San Francisco State University majoring in Biology with a minor in Race & Resistance Studies. Coming back to participate in UCSF SSRP as a mentor this summer, I discovered a newfound love for mentorship. Learning about each of the new students' stories and seeing how nervous they were in the beginning then going onto succeed is an incredible sight. I'm so glad I could be a part of their journeys to success and am so grateful to have experienced firsthand how life changing programs like these are for those from marginalized communities like myself. Thanks to Ellen & David plus my mentors Dr. Long, Akua, Robert, & Cherri at the Claremont Clinic, I know now that I want to be a physician who is mainly in the clinic & does clinical/public health research focused on giving back to the underserved!

INTRODUCTION

The BLOOM Clinic was established in 2023 to combat health inequities in the African-American community by offering racially concordant care. This includes nurses, social workers, & pediatricians of color as well as wraparound services where patients have the ability to see a lactation consultant, family health navigators, and social workers. Thus, families can feel a sense of community and feel understood on a physical, mental, & emotional level that transcends standard clinical care.

OBJECTIVE

The aims of this project are to identify the themes of families' experiences in Pediatric Primary Care at the BLOOM Clinic. We aim to utilize this data to improve the clinical experience for families.

METHODS

This will be a qualitative study that uses an interview method to collect about 40 families experiences who have a child of 0-3 years of age in Claremont Pediatric Care at the BLOOM Clinic. After undergoing thematic analysis, the interview will provide insight into how the BLOOM Clinic can be improved.

ANTICIPATED RESULTS

I anticipate to see positive themes of families seeking the BLOOM clinic for racially concordant care as they can trust the staff enough to understand their shared experiences and feel that the providers are attentive to have all their routine as well as unique needs met through its wraparound services.

SIGNIFICANCE OF PROJECT

This study highlights the importance of having more clinics like BLOOM with its racially concordant care as well as its comprehensive services. The interview responses of overwhelmingly positive themes further emphasize the need for more clinics like BLOOM to combat the illnesses prevalent in the Black community to overall improve patient outcomes leading to a more equitable healthcare system.

Thazin Thiri Than

Optimizing a *Neisseria gonorrhoeae* Peptide Vaccine

Mentor: Peter Beernink, PhD
Contributing Author: Isabel Henley

Hi! My name is Thiri, and I am a SSRP alumni, rising senior, and public health major at UC Berkeley. My first clinical research experience with SSRP inspired me to pursue medicine, healthcare, and science. Since then, I became interested in immunology and infectious diseases, while my family also motivated me to be passionate about how we truly care for vulnerable populations like the communities I grew up in. This summer, I am grateful to continue growing with SSRP and wholeheartedly thank Isabel Henley and Dr. Peter Beernink for their mentorship and allowing me to develop, expand, and apply my scientific knowledge.

INTRODUCTION

Gonorrhea is one of the most common sexually transmitted infections without a vaccine to prevent severe disease. One vaccine candidate incorporates cyclic peptide 2(CP2), which mimics a sugar on the surface of the bacteria and is recognized by a monoclonal antibody (mAb) called 2C7. CP2 induces antibodies that can kill the bacteria and decrease the number of bacteria in vaginal colonization in mice.

HYPOTHESIS

We hypothesize that the CP2 peptide vaccine can be improved by targeted or random amino acid substitutions. Therefore, our objective is to design specific peptide sequences with and without randomized positions and test them for binding to mAb 2C7. A secondary objective is to test whether cyclization of the peptide is important by comparing linear versus cyclic peptides in mAb binding.

METHODS

We designed oligonucleotide sequences encoding linear and cyclic peptide sequences to test as fusions with maltose binding protein (MBP). This strategy enables us to purify the peptides based on MBP affinity for maltose. Next, we designed one oligonucleotide encoding amino acid substitutions to optimize affinity for the mAb and solubility. Finally, we made two degenerate oligos randomized at CP2 sites known to interact with mAb 2C7, which we will use to create a peptide display library in the bacteriophage M13KE vector. We will screen the phage display library to identify clones with the strongest binding to mAb 2C7.

ANTICIPATED RESULTS

We predict that the linear and cyclic peptide sequences' binding affinity to mAb 2C7 will be the same strength. We do not know whether the designed oligonucleotide will have higher affinity for mAb 2C7 because structure-based protein design is unpredictable. We expect to identify clones in our phage display library with higher affinity for mAb 2C7 than CP2 and possibly better biological function.

SIGNIFICANCE OF PROJECT

Gonorrhea is one of the most common sexually transmitted infections, and a major concern due to its spreading antibiotic resistance. The limited number of antibiotic treatments highlights the need for a safe and effective vaccine.

Ana V. Trujillo Anaya

Child and Adult Care Food Program (CACFP): Impact on Nutritional Quality of Meals and Snacks Served by Family Child Care Home (FCCH) Providers with the Higher Covid-19 Reimbursement Rate

Mentor: Kassandra Bacon, MPH
Contributing Author: Lorrene D. Ritchie, PhD

Hi, my name is Ana Trujillo and this fall I'll enter as a junior at UC Berkeley. I'm currently interested in all things nutrition, and I will be studying Nutrition: Physiology and Metabolism and UCB. My passion for nutrition sparked when I was in middle school. As I developed this interest, I became more aware of the nutrition-related community issues. Many of these issues I knew existed in my city since I was a kid but the intensity of them I wasn't aware of until later. Because of the public health nutrition crisis present in my community, my career goals include becoming a Registered Dietitian and opening my own private practice to cater to fellow Hispanics/Latin Americans. I strive to prevent prominent chronic diseases such as diabetes, obesity, heart disease, and more. I want to thank and appreciate my mentor Kassandra Bacon for welcoming me into the Nutrition Policy Institute and for mentoring me throughout my time here. I'm so thankful for the experience I gained this summer working with NPI; and thanks to SSRP, I know now how to put into practice what I learned in the classroom to real life problems.

INTRODUCTION

CACFP is vital for feeding over 4 million U.S. children in childcare from low-income families. It provides licensed FCCHs meeting certain criteria by reimbursing providers for 2 meals and 1 snack served per child daily. Maximizing CACFP reach is crucial for improving health disparities like food insecurity, poor diet quality, and obesity among vulnerable groups like children of color in low-income households. Offering nutrition trainings may help achieve this.

HYPOTHESIS

FCCH providers participating in CACFP serve healthier meals and snacks to the children in their care compared to providers who don't participate in CACFP, and the higher Covid-19 reimbursement rate improved nutritional quality of food/beverages served by all CACFP participating FCCH providers, especially for tier 2.

METHODS

FCCH providers completed an online survey sent to them via email, text and postcard. Survey questions included understanding how the higher COVID-19 reimbursement rate has affected the nutritional quality of meals and snacks served. Data will be cleaned and analyzed to understand any impact of the higher reimbursement rate on diet quality between tiers and those on and not on CACFP.

ANTICIPATED RESULTS

I expect to see that implementation of the higher and equal Covid-19 reimbursement rate allows for all CACFP providers to serve higher quality foods, especially tier 2 providers. I expect that CACFP providers in general serve more nutritious foods than providers not on CACFP.

SIGNIFICANCE OF PROJECT

This work is significant because by studying the implementation of the higher reimbursement rates due to COVID, we can assess differences in nutritional quality of meals and snacks served between tiers and between FCCHs on and off CACFP. Higher reimbursement rates have been shown to enable providers to purchase nutritious, higher quality foods and beverages for the children in their care.

Tiona Truong

Determining the Efficacy of Combined Iron-Chelation Treatments Using In-Vitro Models

Mentor: David Killilea, PhD
Contributing Author: Kathy Schultz, MS

My name is Tiona Truong, and I'm a rising senior at Saint Joseph Notre Dame High School. Ever since I was a child, I've been captivated by science and its endless possibilities; it has become an outlet for me to explore and satisfy my curious mind. With a passion for helping others and a love for working with children, I aspire to become a pediatrician to create a positive difference in the lives of young patients and their families, knowing how it felt, myself, when I was in their shoes. The SSRP has provided me with countless enriching opportunities to explore the intersection between research and medicine, further fueling my desire to provide communities with equitable and accessible quality healthcare. I'm extremely thankful for the support and guidance of my mentors Dr. David Killilea and Ms. Kathy Schultz who have shown me that the beauty of science not only comes from its complexity but also through creative thinking and problem solving. I would also like to thank my family, especially my mom, for being my greatest sources of support and inspiration.

INTRODUCTION

Sickle Cell and Thalassemia are inherited diseases that adversely affect hemoglobin levels by producing abnormal amounts or mutated molecule structures. As a result, red blood cells are more fragile and frequently burst, releasing excess iron that's stored in the body's tissues, mostly within protein complexes called ferritin. Patients often receive blood transfusions to help restore hemoglobin to adequate levels, but this may lead to additional iron overload as a complication with regular transfusions. Although iron is an essential component in producing hemoglobin, it becomes toxic when excessive amounts are present, placing oxidative stress on the body. To mitigate the life-threatening effects of iron overload, metal chelators have been used to bind and excrete iron, preventing reactions that may incite damage to cells. Modeling how these chelators function and interact is vital in understanding their clinical value.

OBJECTIVE

The purpose of this experiment is to observe the strength, specificity, and synergistic activity of iron chelators.

METHODS

The efficacy of iron chelators will be observed using single and combined treatments. A solution modelling the microenvironment of a cell will be treated with ferric ammonium citrate (FAC) to measure chelation activity in an *in vitro* model using fluorescence and absorbance-based assays. Next, we will determine the efficacy of combined chelation treatments in our cell-free system using iron-overloaded ferritin. Chelators (Desferal, L1, and/or Exjade) at varying concentrations will be added in intervals over a 24-hour period to tubes containing the cell model treated with ferritin. These samples will be placed on a shaker and incubated at 37°C to reproduce the physiological conditions of the human body. Ferritin will be separated from the solution and measured for metal content using an inductively coupled plasma optical emission spectrometer (ICP-OES).

ANTICIPATED RESULTS

In an *in vitro* model, all chelators showed iron binding activity with Desferal being most efficacious. No additive synergistic activity was observed with the chelators in this model. We expect to see more complex relationships with the chelators when using iron-overloaded ferritin.

SIGNIFICANCE OF PROJECT

Determining the efficacy of combined chelation treatments using *in vitro* assays allows for an elucidation of interactions influenced by chelators which provides a foundation for translational research to optimize clinical strategies and enhance therapeutic regimens.

Elisa Ulloa

Evaluation of the Validity and Reliability of a Site-Level Assessment Questionnaire Designed to Assess the Nutrition Environment of Food Retail Stores

Mentor: Miranda Westfall Brown, PhD, MPH, RDN
Contributing Authors: Janice Kao, MPH; Ramsha Baig, MPH; Sridharshi Hewawitharana, MPH

Hello! My name is Elisa Ulloa, and I am a rising third-year human biology major at the University of California, Irvine. I have always been interested in the medical field and hope to be a pediatrician. As a low-income, first-generation college student my experiences have shaped my desire to practice medicine and have a significant impact on bridging the gaps in healthcare accessibility in underserved communities. SSRP has given me the opportunity to participate in clinical research that impacts environments similar to mine, allowing me to connect my goals to reality, and forming a bridge to my goals. I deeply appreciate my mentors who have guided me throughout this program, Dr. Miranda Westfall, Dr. Lorrene Ritchie, and Janice Kao. I would also like to thank the SSRP program leaders, Dr. Ellen Fung and Dr. David Killilea, and the staff for their support throughout the program.

INTRODUCTION

Supplemental Nutrition Assistance Program Education (SNAP-Ed) is a federally funded program that aims to promote healthy eating and active living among SNAP-eligible people. One key SNAP-Ed intervention approach is policy, systems, and environmental changes (PSEs), which aim to create conditions that make healthier choices easier and more accessible.

The Nutrition Policy Institute developed a Site-Level Assessment Questionnaire (SLAQ) to evaluate PSE interventions in retail settings. The SLAQ measures multiple elements of the retail environment including the availability, pricing, and promotion of healthy and unhealthy foods.

OBJECTIVE

The objective of this study is to determine whether the Retail SLAQ is a valid and reliable tool to assess the nutrition environment of food retail stores.

METHODS

To assess validity, SLAQ data will be compared to two existing retail assessment tools (NEMS-S and CX3). Validity will be assessed by comparing each SLAQ item to items measuring the same construct on the NEMS-S or CX3 tools. Pearson or Spearman correlation coefficients will be used for analysis.

To assess inter-rater reliability, two data collectors will complete the SLAQ independently at the same retail location and time. Weighted kappa statistics will be calculated to examine the degree of agreement between the two data collectors.

Data will be collected from a convenience sample of retail sites, completed once n=30 responses are reached for each question across all three survey tools.

ANTICIPATED RESULTS

We anticipate that the SLAQ will be a valid and reliable tool for assessing the nutritional environment of food retailers. Correlation coefficients of 0.5-1 (large correlation) will indicate concurrent validity. Weighted kappa statistics of 0.45 (substantial) or greater will indicate high inter-rater reliability.

SIGNIFICANCE OF PROJECT

Having a valid and reliable tool to assess the environment of retail stores is important for driving effective PSE interventions that make healthy food more accessible, appealing, and affordable for individuals in low-income communities.

Sofia Valdez

Creating Educational Material by Assessing Patient Understanding of Latent TB Infection and Active TB Disease

Mentor: Mai Baalbaki, MD, MSc

Hi! My name is Sofia Valdez, a rising senior at Wallenberg High School. Growing up surrounded by healthcare professionals fostered my strong passion for healthcare. My journey began when I immersed myself in various programs, participating in an academic healthcare administration program, enrolling myself in a short intensive Emergency Medicine course, and volunteering at UCSF Parnassus in their Neuroscience Nursing Unit. I decided to join SSRP to gain hands-on experience, and valuable insights into research. It was such a fulfilling experience to conduct research while seeing patients at the Berkeley Free Clinic. I plan to attend a four-year university to pursue pre-med. SSRP exceeded my expectations. It is more than just research, but a space to grow with like-minded individuals! For this, I am beyond grateful for the SSRP leadership team and Dr. Mai Baalbaki for this wonderful opportunity.

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis* and remains a significant public health concern in the US. TB disproportionately impacts vulnerable populations, immigrants, and unhoused individuals. In California, TB incidence is 5.4 per 100,000 persons, nearly twice the national rate of 2.5, driven by factors that hinder timely diagnosis and treatment. In 2023, San Francisco reported a TB rate of 8.1, more than triple the national rate. TB infections can be categorized as either latent TB infection (LTBI), which is asymptomatic and non-infectious, or active TB disease, which is symptomatic, infectious, and spreads through aerosolized droplets. Diagnostic tests for TB include the tuberculin skin test (TST) and the more specific interferon-gamma release assays (IGRA). Effective diagnosis and treatment of LTBI prevent progression to active TB disease.

HYPOTHESIS

Analysis of patient surveys would identify common barriers to TB testing in the Berkeley Free Clinic. Once identified, these barriers would be addressed to improve patients' access to TB services and increase healthcare equity for vulnerable populations.

METHODS

A verbal questionnaire was designed to identify barriers related to patients' understanding of TB transmission, symptoms, and diagnostic tests. A mixed-method survey was utilized, containing both free-response and Likert scale-based questions. This survey was given to asymptomatic adult patients accessing TB testing at the Berkeley Free Clinic in July 2024. Descriptive statistics and thematic analysis will allow quantitative and qualitative questions to be analyzed, respectively. Results will inform the creation of patient education materials and TB outreach events in the community.

ANTICIPATED RESULTS

Berkeley Free Clinic patients may have limited knowledge of TB pathophysiology and testing. We anticipate that the dissemination of patient-informed education material could improve participation in TB testing, reduce loss to follow-up, and consequently improve patient outcomes.

SIGNIFICANCE OF PROJECT

Designing patient educational materials informed by patients empowers patients to take a proactive approach and make informed decisions regarding their own health, improving health outcomes.

August Vaznaugh-Sanchez

Assessing the Role of CXCR4 in Postnatal Inhibitory Interneuron Migration

Mentors: Aunoy Poddar, BA; Mercedes F. Paredes, MD, PhD

Hello! I'm August Vaznaugh-Sanchez, and this fall I'll be going into my second year at the University of Rochester. My intended major is neuroscience, with a minor in Spanish. Through SSRP, I've been given the opportunity to research early childhood neurodevelopment in the Paredes Lab at UCSF, which has exposed me to a variety of examples of what a successful career in neuroscience can look like. I am so thankful for Aunoy Poddar, who has done so much to both support my learning and challenge me to work in a totally new environment; for Dr. Mercedes Paredes, who has fostered a welcoming lab environment for newcomers to and experts in neurodevelopment alike; and for the Paredes Lab, for being an approachable, knowledgeable, and passionate group of people. My internship this summer has made my future as a scientist look more feasible than ever, and I'm so excited to see what doors it will open.

INTRODUCTION

The brain is formed by way of young neurons migrating from one area of origin, to ultimately form the structure of a highly complex organ. Recently, it was discovered that neurons continue to migrate to the cortex after birth in some large-brained mammals, but it is not well known which factors direct their migration. The expression of the *CXCR4* gene has been documented in a variety of cells throughout the body, but the function it carries out in postnatally migrating neurons is not yet known. The present study investigated the CXCR4/CXCL12 interaction in postnatally born migratory interneurons in the piglet model system to make observations more applicable to human brain development.

HYPOTHESIS

In the postnatal period, the expression of the *CXCR4* gene in newly created inhibitory interneurons regulates their migration patterns and final destination.

METHODS

We sourced the samples used in this experiment from the brains of pigs ranging from E98 to P7. The samples assigned to the treatment group were cultured with AMD3100, which inhibits the binding of CXCR4 to CXCL12. After this period, each sample was immunolabeled for DAPI, DCX, and PSA-NCAM. To do in situ hybridization, we designed a CXCL12 RNA probe with ACDBio. Using this probe, we performed the RNA scope high-definition red assay and image using confocal microscopy. We then quantified the expression of CXCL12 in different anatomical regions.

ANTICIPATED RESULTS

We predict that when the CXCR4 receptor is inhibited from interacting with its ligand, the neurons will show evidence of migration, though not to a specific destination. We also believe that CXCL12 will be expressed in the developing cerebral cortex in all samples, and that migratory interneurons in samples not treated with AMD3100 will have relatively linear leading process morphologies and a clear direction.

SIGNIFICANCE OF PROJECT

Migration of young neurons to the "correct" location in the brain is essential for proper development and for preventing brain malformation. Interneuron dysfunction and misplacement have been found to be associated with numerous disabling conditions. A greater understanding of the mechanisms behind interneuron migration can provide insights into the sources of human phenotypic diversity.

Kaylena Vuong

Evaluating Procalcitonin Utilization in Clinical Pediatric Settings: A Provider-Focused Survey

Mentor: Prachi Singh, DO, FAAP

Hello! My name is Kaylena Vuong and I will be a freshman attending UCLA in the upcoming fall. I plan to double major in psychology and psychobiology, hoping to pursue a career in criminal psychology. As a first-generation minority student, I've had the privilege of participating in multiple medical programs that showed me the importance of providing an inclusive and equitable environment for students so they can thrive. I've come to grow excited about healthcare the more I immersed myself in it, and I find myself yearning to leave a lasting impact on my community through my efforts and abilities. I am grateful that the SSRP Program exists as an opportunity for students like myself who have a genuine research interest to voice their passion to the world. This summer, I was able to work with my mentor, Dr. Prachi Singh, whom I am very thankful for as she guided me through the tough research process and provided me with a deeply valuable learning experience that I will take with me into my future endeavors.

INTRODUCTION

Procalcitonin (PCT) is a biochemical marker that has been studied to distinguish between bacterial and viral infections such as lower respiratory tract infections (LRTI) and meningitis. It rises rapidly within 20-30 hours in bacterial infections, aiding in guiding judicious microbial therapy decisions. Despite increased utilization, systematic implementation and provider understanding of PCT remain poorly understood.

OBJECTIVE

This study aims to assess provider practice in the use of the biomarker PCT in a clinical setting, specifically focusing on its application in immunocompetent children with respiratory infections evaluated in emergency departments or non-critically ill hospitalized children.

METHODS

This observational cross-sectional survey was conducted among providers at UCSF Benioff Children's Hospital – Oakland. Providers completed an anonymous 15-question online survey via the HIPAA-compliant REDCap system. The first two questions determined the provider's level of practice, while subsequent questions used a Likert scale to assess PCT use in children over 12 months admitted for unspecified febrile illness. After collection, survey data was summarized and analyzed to evaluate providers' use of PCT and identify any correlations or variations.

PRELIMINARY RESULTS

A total of 24 participants were surveyed: 3 (12.5%) male and 21 (87.5%) female. Occupational roles included 18 (75%) resident physicians, 5 (20.8%) hospitalists, and 1 (4.2%) fellow physician, with the majority (91.7%) having less than 5 years of practice. Fifteen participants (62.5%) used elevated PCT >0.5 mg/l to guide starting empiric antibiotics in children with respiratory illness, 7 (29.2%) about half the time, and 2 (8.3%) seldom used it. We expect the survey results to indicate variability in PCT usage, highlighting ambiguity or conflict among clinicians regarding its application.

SIGNIFICANCE OF PROJECT

Up to 28% of antibiotic prescriptions are unnecessary in medical practices and emergency departments. Conducting a research survey among medical providers/physicians to assess their use of PCT provides insight into the extent of its adoption and patterns, demonstrating how it is integrated into decision-making and guideline adherence. Additionally, it would help correlate PCT use with diagnostic accuracy and patient outcomes, particularly in antibiotic stewardship. Identifying variables in PCT implementation can guide strategies to promote its effective use and inform researchers about potential improvements.

Kyle Wong

The Impact of Socio-Economic Factors on Diabetes Technology Use: A Prospective Study Revolving Children with Type 1 and 2 Diabetes at Oakland Benioff Children's Hospital

Mentors: Kevin Ye, MD; Jenise Wong, MD; Sonali Belapurkar, MD

Hi! I'm Kyle Wong, a rising freshman at UC San Diego, majoring in Human Biology. As a first-generation Asian-American in a Hispanic-dominated environment, I was an outliner within society. Living off food stamps and clothes from charity opened my eyes to the many socioeconomic disparities immigrant families undergo. Seeing the long-lasting impacts of my family's language barriers have allowed me to gain a better perspective of the systemic inequities minorities undergo when it comes to accessing resources, sparking my interest in this field. Through SSRP, Dr. Yen, Dr. Wong, and Dr. Belpurkar have supported my journey towards assisting underrepresented minorities whom I can identify with. Through our work with diabetes technology, I've been able to better connect with families within Oakland and the surrounding area on a personal level. growing more connected with the community.

INTRODUCTION

Diabetes is a condition that affects individuals of all age groups that's characterized by elevated blood sugar levels due to a lack of insulin activity. Advancements in diabetes technology (DT) with continuous glucose monitoring (CGM), insulin pumps, and mobile applications provide real-time data on patients' blood sugar levels which helps them monitor and adjust insulin. However, disparities in access and utilization remain, particularly among under-resourced populations. These disparities are influenced by social drivers of health (SDOH), including financial constraints and limited access to healthcare.

HYPOTHESIS

Patient families from under-resourced backgrounds face increased barriers to using DT, which may lead to higher rates of discontinuation.

METHODS

A prospective observational cross-sectional study was conducted to investigate the influence of SDOH on the use of DT among patients from under-resourced backgrounds. Data on demographics, insurance status, primary language, and specific diabetes devices were collected using Redcap across ~60 hours of clinical observations. Qualitative data on challenges and barriers were gathered through interviews with nurses alongside observations during patient visits and at the front desk. Statistical analysis was performed to identify correlations between SDOH and DT utilization.

ANTICIPATED RESULTS

We anticipated device issues were more prevalent among individuals who are publicly insured and whose primary language at home is not English.

Across 32 individuals, CGMs (71.9%) were most used to check BG, with the majority of CGMs being Dexcom G6/G7 (83.3%). From 20 insulin pump users, Omipod (60%) was the most used, then Tandem (35%), and iLet (5%). 78.1% were under public insurance with 21.9% under private. 100% of patients using Tandem, regardless of insurance, were unable to be set up for remote patient monitoring, leading to inaccuracies in data collection and impacting treatment plans.

SIGNIFICANCE OF PROJECT

Suboptimal glycemic control and the risk of diabetes complications are more prevalent in patients facing socioeconomic disparities and in those from minoritized racial and ethnic groups. DT is known to improve glycemic control and the risk of subsequent complications. However, disparities exist, and combined with the lack of knowledge about DT, many families are unable to get the assistance they need. By understanding barriers and optimizing DT usage among Oakland families, medical professionals will be more equipped to work with families to manage their condition.

Nyari Wright

Does Cesarean delivery (C-section) Increase the Risk of Respiratory Illnesses in Puerto Rican Infants and Toddlers?

Mentor: Jonathan Witonsky, MD

Hello! My name is Nyari Wright, and I am an incoming freshman at Northeastern University, majoring in Computer Science + Behavioral Neuroscience on a Pre-Med track. Since a child, I have been fascinated by how the brain works and the essential role neurology plays in all living beings which has led to my dream of becoming a Neurologist. In my free time, I love to read, watch anime, and go on walks. I hope to contribute to innovative solutions that improve patient care by combining technology with medical science. This summer, I had the privilege to work with Dr. Jonathan Witonsky to learn about the relationship between cesarean delivery and early life respiratory illness. I want to greatly appreciate and thank UCSF SSRP and Dr. Witonsky for giving me this opportunity to conduct research for the first time. I learned so many new things and met so many inspiring people. This experience has set a strong foundation for my goal to use the intersection of Computer Science and Behavioral Neuroscience to strengthen our understanding of the human brain and improve healthcare outcomes.

INTRODUCTION

Puerto Rico has one of the world's highest cesarean delivery rates with over 50% of babies born via Cesarean delivery. This is due to the lack of economic resources and qualified medical personnel causing their healthcare system to decline. In Puerto Rico, about 15% of babies born via Cesarean delivery suffer from respiratory illnesses leading to many unfortunate events, such as missing school, numerous visits to the emergency room, self-isolation due to illness, and more.

HYPOTHESIS

Infants born via Cesarean delivery are at a higher risk of developing respiratory illnesses during early childhood compared to those born via vaginal delivery.

METHODS

PRIMERO, the Puerto Rican Infant Metagenomics and Epidemiologic Study of Respiratory Outcomes, investigates early airway development and childhood asthma by studying infants exposed to various viral respiratory illnesses (RIs). The study recruited 2,100 newborns in Caguas, Puerto Rico, between February 2020 and June 2023. Data and samples, including delivery methods, were collected at birth. Post-discharge, participants enter a two-year RI surveillance phase. Logistic, Poisson, and Cox regressions will be used to determine whether the delivery method is associated with increased odds, rate, and hazard ratios for the first respiratory illness.

ANTICIPATED RESULTS

Previous studies investigating the association between delivery method and early-life respiratory illnesses have produced conflicting results. For example, Magnus et al. found that children delivered via cesarean section had a higher incidence of lower respiratory tract illnesses (LRTI) compared to those delivered vaginally (5.7% vs. 4.5%). In contrast, Salem et al. (*AJOG* 2022) did not find an association between cesarean delivery and respiratory symptoms in infancy. Additionally, Salem et al. found no difference in lung function during infancy or at school age between children born by cesarean delivery and those born vaginally.

SIGNIFICANCE OF PROJECT

Gaining an understanding of the potential risk factors for early respiratory illnesses can decrease the morbidity associated with respiratory illnesses.

Kristy Xiao

Knocking out miR-432 in iPSCs

Mentor: Mohammad H. Mehraban, PhD
Contributing Author: Aras N. Mattis, MD, PhD

Hello! My name is Kristy Xiao and I am an incoming freshman at the University of California, Los Angeles where I intend to major in physiological science. Growing up, curiosity was my dominant trait. In elementary school, I often bombarded my family with questions about the world, frequently asking why something happened and how. As I matured, I began to use science to explain and answer my boundless questions. Since taking physiology in high school, I have developed a specific interest in understanding how the human body functions. This interest has led me to participate in research at UCSF. Last year I researched intestinal stem cells and now this summer I am excited to be researching liver stem cells. My goal for the future would be to contribute to advances in medical science to help create a healthier and safer world. Furthermore, I am grateful for the guidance and support from my mentor, Dr. Mohammad Mehraban, as well as members of the Mattis lab and SSRP Leadership team in helping me further my passion for science.

INTRODUCTION

Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD) affects up to 25% of people worldwide. MASLD is characterized by abnormal lipid accumulation in the liver and is associated with hypertension, obesity, and insulin resistance. Excessive lipid buildup in the liver can induce stress in the endoplasmic reticulum, leading to inflammation and cell damage. This inflammatory state can progress to Metabolic Dysfunction-Associated Steatohepatitis (MASH). A key gene involved in regulating liver lipid metabolism, TM6SF2, plays a critical role in this disease progression. Notably, single nucleotide polymorphisms (SNPs) such as TM6SF2 rs58542926 are associated with increased hepatic triglyceride content, thereby increasing susceptibility to MASLD. Furthermore, microRNA miR-432 has been identified as a regulator of TM6SF2 by binding to and degrading TM6SF2 mature mRNA. This mechanism highlights miR-432's role in modulating TM6SF2 activity, potentially influencing the progression of MASLD to MASH.

OBJECTIVE

We aim to investigate the effects of miR-432 knockout on TM6SF2 expression and lipid accumulation in human iPSCs.

METHODS

To study the effects of miR-432 on TM6SF2 mRNA stability, we utilized CRISPR-Cas9 to knock out miR-432 in Wildtype human iPSCs. Following knockout, iPSCs were cultured in 6-well plates. Verification of miR-432 knockout was confirmed through DNA extraction, PCR amplification, Sanger sequencing, and ICE analysis. Subsequently, we compared the expression levels of Wildtype human iPSCs using RT-qPCR. Finally, to assess lipid content, cells were challenged with oleic acid and stained with Nile red.

ANTICIPATED RESULTS

Knocking out miR-432 should increase the stability of TM6SF2 mRNA leading to higher TM6SF2 protein levels. Increased TM6SF2 protein can function more effectively in regulating lipid metabolism, reducing lipid accumulation in hepatocytes.

SIGNIFICANCE OF PROJECT

Despite extensive research in this metabolic disease, the direct causes of MASLD and MASH are unknown. Findings from this study can help confirm that miR-432 binds and degrades the rs58542926 TM6SF2 variant and that unstable TM6SF2 mRNA contributes to lipid accumulation in hepatocytes. This would also implicate miR-432 as a therapeutic target in carriers of this SNP.

Winston Zapet Bamac

High levels of Cathepsin S and B in Sickle Cell Disease

Mentors: Angela Rivers, MD, PhD; Eric Soupene, PhD

Hello! My name is Winston Zapet Bamac and I am in incoming sophomore at the University of Puget Sound studying Biochemistry. I can recall my interest in science back to the second grade where I put down “Scientist,” as my dream profession. My sister has also been one of my greatest inspirations; she’s demonstrated that a first-generation college student can accomplish amazing feats, it might just take a little more eQort! One of my favorite activities is meeting new people—learning about their experiences is in my opinion, one of the greatest joys in life. My love for science and people inspires me to pursue an MD/PhD, hopefully caring for patients as a Family Medicine doctor while further pursuing research. This summer gave me opportunities to deepen my technical skills and I am incredibly grateful to Dr. Angela Rivers and Dr. Eric Soupene for their mentorship and the warm members of the Rivers Lab for welcoming me. Thank you to the SSRP Team for giving me the opportunity to be part of something incredibly special.

INTRODUCTION

Sickle Cell Disease (SCD), an inherited genetic disorder, affects the function of red blood cells (RBC). A single mutation causes abnormal polymerization resulting in fragility of the sickle-shaped red cells and anemia. RBC’s specialized function requires clearance of cytosolic organelles before they’re released in the circulation by a process called autophagy. Sickle cells retain mitochondria, suggesting that mitophagy, a mitochondria-specific autophagy, may be impaired. Preliminary experiments revealed increased expression of Cathepsin S (CTSS) and Cathepsin B (CTSB) in the plasma of SCD patients. CTSB and CTSS are lysosomal proteases that negatively regulate autophagy; their elevated levels have been linked to heart and kidney disease.

HYPOTHESIS

We hypothesize that CTSB and CTSS levels will be elevated in the plasma and organs of mice with sickle cell trait (AS) and SCD (SS) compared to control mice. Additionally, we expect to observe higher levels of CTSB and CTSS in the plasma of patients with sickle cell trait (AS) compared to healthy controls.

METHODS

Whole blood and plasma samples are extracted from mice that express human SCD. Mouse tissues are collected and snap frozen after vascular perfusion with phosphate buffered saline. Human blood samples are collected from individuals with SCD at UCSF Benioff Children’s Hospital.

ELISA Assay Kits for CTSS and CTSB were used to quantify the proteins. Enzyme Activity Assays were used to determine the activity of CTSS and CTSB. The Bradford Total Protein Assay was used to determine the total protein concentration within the samples.

ANTICIPATED RESULTS

We expect elevated levels of CTSB and CTSS in the plasma of mice with SCD and Sickle Cell Trait; we also expect elevated levels of CTSB and CTSS in the organs of mice with Sickle Cell Trait and SCD than those of healthy mice.

SIGNIFICANCE OF PROJECT

This study can reveal a therapeutic target for treating individuals with SCD. Inhibition of CTSB or CTSS may be combined with current therapeutic targets to increase the efficacy of treatment.

Spotlight on our SSRP Alumni

Gabino Guzman Losoya

Adriana Medina

Mercy Niyi-Awolesi

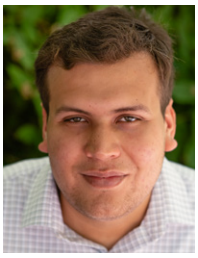
Jason Tesfa

Thazin Thiri Than

Each year, a small group of students are selected to participate in the SSRP programming for a second year as 'Alumni.' These students are selected on the basis of leadership potential, research curiosity, drive and passion for science. They applied to the program because they valued their SSRP research experience and had a desire to dig deeper into a research project related to their first SSRP internship or a completely novel research area. In addition to their own independent research, they are responsible for leading a small group, supporting fellow interns as they negotiate research obstacles, and develop a sense of community amongst the interns. We are incredibly proud of this group of alumni and thank them for their assistance this summer. We look forward to following the career trajectories of these bright young students.

43rd Annual Summer Student Research Program Symposium

National Institutes of Health (NIH) Scholars


Andres Carrillo Solis


Samantha Collins


Sydnie Domingue


Yassi Gitiforooz


Nicole Ibarra-Barragan


Mina Khalil


Isabella Lejano


Rue Moe


Gracie Osborne


Talisha Pereira


Shea Stubblefield


Ari Taubenfeld


Jason Tesfa


Thazin Thiri Than


Ana Trujillo Anaya


Elisa Ulloa


August Vaznaugh-Sanchez


Winston Zapet Bamac

This group of undergraduate students was funded by the National Institutes of Health (NIH), STIMULUS grant (Science & Technology IMmersion for Underrepresented Learners in the US). The students were selected from a competitive pool of undergraduates who attend schools throughout the United States. Each NIH funded student developed their own hypothesis driven project, carried out this project during the 9-week one-on-one mentored program, presented a brief 'flash talk' about their work to their peers, participated in a half-day clinical simulation experience, weekly journal clubs, ethics discussions, scientific and educational enrichment activities and will be presenting the findings of the results from their project in both oral and poster presentation formats during the SSRP symposium sessions.

California Institute for Regenerative Medicine (CIRM) Scholars

Nghi Nham

Mercy Niyi-Awolesi

Belem Osorio

Nicole Padilla Alvarado

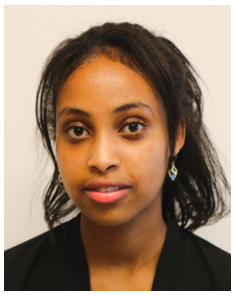
Vy Phan

Kristy Xiao

This group of students was funded by the California Institute for Regenerative Medicine (CIRM) Sustain-A-SPARK grant (Supporting Underrepresented STEM Adapting to Change: Summer Program to Accelerate Regenerative Medicine Knowledge). Their summer research project's focused primarily on stem cell, progenitor cell or stem cell translational research. In addition to their research, they presented a brief 'flash talk' about their work to their peers, they engaged in patient focused activities, blogged about their research activities, and attended numerous additional education activities regarding stem and bone marrow transplant. These students will have the opportunity to present their results twice, at the CIRM-SPARK annual conference with the other CIRM SPARK trainees from California, and again at our SSRP research symposium.

Doris Duke Charitable Foundation (DDCF) Scholars


Belinda Bautista Pablo


Elim Berhe


Daviere Johnson-Burton


Adriana Medina


Sofia Ramos


Tiona Truong


Sofia Valdez


Kaylena Vuong


Kyle Wong


Nyari Wright

These students were funded by a grant from the Doris Duke Charitable Foundation, SUSTAIN grant (SSRP Supporting Underrepresented STEM students AdaptINg to Change). Both high school and returning SSRP DDCF Scholars who are now undergraduate students are funded under this funding mechanism. All students are interested in pursuing careers in bioscience and/or health care. Each DDCF funded student developed their own hypothesis driven project with the assistance of their mentor, carried out this project over our 9-week program, presented a brief ‘flash talk’ about their work to their peers, participated in weekly journal clubs, scientific and educational enrichment activities. Each student is presenting the results of the findings from their project in both oral and poster presentation formats during the SSRP symposium sessions.

LUBIN Scholar

Gabino Guzman Losoya

This undergraduate student was funded by the Bertram Lubin Scholarship Grant. The Scholarship is in memory of the founder of SSRP, Dr Bertram Lubin. Dr. Lubin was a deeply passionate clinician, scientist and visionary. His goal was to provide research opportunities to students typically underrepresented in the sciences. This student was selected from a competitive pool of applicants from all over the United States. He developed his own hypothesis driven project, carried out this project during the 9-week one-on-one mentored program, presented a brief 'flash talk' about his work to his peers, participated in weekly journal clubs, scientific and educational enrichment activities. He is presenting the results of the findings from his project in both oral and poster presentation formats during the SSRP symposium sessions.

UCB Masters in Dietetics Intern

Aimee Kiang

For the first time this year, we collaborated with the administrators from the Master's Degree in Dietetics Program at the University of California, Berkeley. This 2-year Clinical Dietetics program requires each student to complete a summer research Cap Stone project. This student, part of the inaugural class, was selected from a competitive pool of applicants from all over the United States. With the guidance of her research mentor, she developed her own hypothesis driven project, carried out this project during the 9-week one-on-one mentored program, presented a brief 'flash talk' about her work to her peers, participated in weekly journal clubs, scientific and educational enrichment activities. She is presenting the results of the findings from her project to the UC Berkeley Nutrition Faculty at their research symposium, as well as part of the SSRP symposium sessions.

This Year's Mentors

Mentor	Department, Division	Location
Pallavi Agarwal, MD	Pediatrics, Hematology/Oncology	UCSF Benioff Children's Hospital Oakland
Akua Agyekum	Clinical Research Coordinator	UCSF Benioff Children's Hospital Oakland
Tariq Ahmad, MD	Pediatrics, Endocrinology	UCSF Benioff Children's Hospital Oakland
Mai Baalbaki, MD	Berkeley Free Clinic	UC Berkeley
Lela Bachrach, MD MS	Pediatrics, Adolescent Health	UCSF Benioff Children's Hospital Oakland
Kassandra Bacon, MPH	Nutrition Project Policy Analyst	Nutrition Policy Institute
Mary Helen Barcellos-Hoff, PhD	Molecular Oncology	UCSF, Mount Zion Campus
Peter Beernink, PhD	Pediatrics, Virology	UCSF, MLK Research Building
Sonali Belapurkar, MD	Pediatrics, Endocrinology	UCSF Benioff Children's Hospital Oakland
Jennifer Chen, MD	Hepatology	UCSF, Parnassus Campus
John Chorba, MD	Cardiology	MLK Research Building, UCSF
Baylee Decastro, MPP	Director, Strategic Initiatives	UCSF Benioff Children's Hospital Oakland
Ayca Erkin-Cakmak, MD	Pediatrics, Endocrinology	UCSF Benioff Children's Hospital Oakland
Meagan Esbin, PhD	Postdoctoral Scholar	UC Berkeley
Ellen Fung, PhD RD CCD	Pediatrics, Hematology	UCSF Benioff Children's Hospital Oakland
Jessica Gonsalves	Project Manager	UCSF, Parnassus Campus
Hart Horneman, BS	Pediatrics, Hematology	UCSF, MLK Research Building
Shahrbanoo Keshavarz, PhD MSc	Pathology	UCSF, Mission Bay Campus
David Killilea, PhD	Office of Research	UCSF, MLK Research Building
Sarah King, PhD	Pediatrics, Cardiology	UCSF, MLK Research Building
Ron Krauss, MD	Pediatrics, Cardiology	UCSF, MLK Research Building
Jenny Lee, PhD	Investigational Cellular Therapy	UCSF, Mission Bay Campus
Ke Li, PhD	Investigational Cellular Therapy	UCSF, Mission Bay Campus
Dayna Long, MD	Pediatrics	Claremont Clinic
Aris Mattis, MD PhD	Pathology	UCSF, Mission Bay Campus
Marisa Medina, PhD	Pediatrics	UCSF, MLK Research Building
Mohammad Mehraban, PhD MS	Pathology	UCSF, Mission Bay Campus
Robert Mok, BS	Pediatrics	UCSF Benioff Children's Hospital Oakland
Jason Nagata, MD MSc	Pediatrics	UCSF, Mission Bay Campus
Henry Ocampo, MPH	Office of Diversity, Equity, Inclusion	UCSF Benioff Children's Hospital Oakland

This Year's Mentors

Mentor	Department, Division	Location
Akin Oni-Orisan, PharmD, PhD	Pharmacy	UCSF, Parnassus Campus
Mercedes Paredes, MD PhD	Neurology	UCSF, Mission Bay Campus
Aunoy Poddar, MSTP	Neurology	UCSF, Mission Bay Campus
Yuanyuan Qin, PhD	Pediatrics	UCSF, MLK Research Building
Angela Rivers, MD PhD	Pediatrics, Hematology	UCSF Benioff Children's Hospital Oakland
Boris Rubinsky, PhD	Mechanical Engineering	UC Berkeley
Coleen Sabatini, MD	Pediatrics, Orthopedic Surgery	UCSF Benioff Children's Hospital Oakland
Stephanie Sandoval-Pistorius, MD PhD	Postdoctoral Scholar, Neurology	UCSF Weill Institute for Neuroscience
Kathy Schultz, MS	Office of Research	UCSF, MLK Research Building
Brian Shy, MD PhD	Investigational Cellular Therapy	UCSF, Mission Bay Campus
Prachi Singh, DO FAAP	Pediatrics, Infectious Diseases	UCSF Benioff Children's Hospital Oakland
Matthew Stachler, MD PhD	Molecular Pathology	UCSF, Parnassus Campus
Marsha Treadwell, PhD	Pediatrics, Psychology/ Hematology	UCSF Benioff Children's Hospital Oakland
Madhav Vissa, MD	Hematology/Oncology	UCSF Benioff Children's Hospital Oakland
Miranda Westfall, PhD MPH	Nutrition	Nutrition Policy Institute
Jonathan Witonsky, MD	Pediatrics, Allergy & Immunology	UCSF Benioff Children's Hospital Oakland
Jenise Wong, MD	Pediatric, Endocrinology	UCSF, Mission Bay Campus
Susan Yang	Clinical Research Coordinator	UCSF Benioff Children's Hospital Oakland
Kevin Yen, MD	Pediatric, Endocrinology	UCSF, Mission Bay Campus
Yuqing Zhang	Pediatrics, Cardiology	UCSF, MLK Research Building

Notes

Notes

Summer Student Research Program

Focusing on our diversity

Summer Student Research Program
5700 Martin Luther King Jr. Way
Oakland, CA 94609
summerstudents.ucsf.edu