UCSF Benioff Children's Hospital
Oakland

42nd Annual Summer Student Research Program Symposium

Friday, August 4, 2023

Our theme this summer was
***2023 Finding the STEM in ME*.**

Read forward, it expresses our goal to cultivate and nurture
an interest in STEM within the student interns.
Read backwards, it is wordplay on literally finding ‘me’ within ‘STEM.’

The tree may look familiar to some Bay Area natives as it is similar
to the City of Oakland logo, building on the same metaphor
for growth and being rooted in the community.

Welcome to the 42nd Annual Summer Student Research Symposium! We are here to applaud this year's incredibly bright, curious and creative interns, who, in their diversity also represent the hope for the future in biomedical research. Though the interns come from diverse racial and socioeconomic backgrounds, all have one common goal—they are considering careers in biomedical research and other health care fields.

Over the past 9 weeks, these students have been exploring challenging basic, clinical and public health questions, actively engaged in weekly scientific lectures, and explored what it means to actually "do science". Their rigorous weekly curriculum included journal clubs, ethics discussions and clinical simulations, and blogging on social media. Some interns shared their science with patients recovering from a bone marrow transplant through the CIRM Pen Pal program. On the lighter side, students connected through small group discussions, lunches, game nights, and other social events. While we move out of the COVID-pandemic, a number of interns struggled silently with mental health issues, or had to overcome significant logistical obstacles to conduct their research at UCSF. Despite these challenges, students have been courageous, strong and resilient- character traits that will prove invaluable as they continue on in their academic journey.

A total of 42 interns will be presenting the findings of their research over the next 2 days. On Thursday, August 3rd, each student will give a 5-minute oral presentation and answer questions from their peers about their research. All presentations will be given over zoom, the format we continue to use for curriculum this summer to allow for flexible schedules and decreased transportation costs. On Friday, each student will present their findings in the form of a scientific poster. Practice sharing scientific data thru different mediums hone students' ability to communicate complicated science to the public, a skill set essential for budding scientists. We invite you to join these inquisitive young minds as they share what they have explored this summer, topics ranging from frailty and housing insecurity in women with HIV, factors associated with clinical outcomes in tuberculosis, understanding kidney function and practices to advance anti-racism in sickle cell disease, to the validation of differentiation of iPSCs into hepatocytes. We think you will be impressed by what these students have been able to accomplish this summer.

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 MLK, BCH-Oakland, UCSF and UCB 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 the SSRP leadership team: David Killilea, Roialle Luckett, and Lisa Romero, as well as others who volunteered their time to assist our students including Kathy Schultz, Allison Killilea, Holly Duden, Hart Horneman, Raquel Manzo, Lily Mirels and all UCSF and BCH-Oakland staff, guest seminar speakers and other friends of the SSRP for their effort and time. This summer's program could not have been the huge success that it was without them. We acknowledge the support and funding provided by the NIH, DDCF, CIRM, and the Lubin Scholarship Fund. 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 are 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

2023: Finding the STEM in ME

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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
#2020-241
Co-PI: Fung EB, Treadwell M

National Science Foundation
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Award No. 1564587
Co-PI: Mark Wong, PhD, Seti Sidharta, PhD

The Bertram Lubin Scholarship Fund

Various Anonymous Donors

Program Advisory Committee Members

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

Gino Galvez, PhD
External Evaluator, SSRP
Director, Center for Evaluation and Educational Effectiveness (CEEE)
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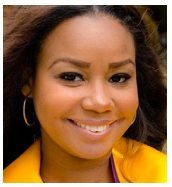
Adjunct Professor, Division of Hematology, UCSF
Co-Director, SSRP
UCSF Benioff Children's Hospital Oakland



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

SSRP 2023 Selection Committees

Undergraduate, Feb. 24, 10am-12 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

Tajii Thomas
SSRP Alumni
Graduate, Howard University

Steve Mack, PhD
Adjunct Professor, UCSF

Karen Daley, MA, LMFT
Founder, Many Rivers Healing

Marvin Lopez
Director, Student Programs
Engineering Student Services, UC Berkeley

Yuanyuan Qin, MBBS PhD
Assistant Researcher, UCSF

Yu-Lin Kuang, PhD
Lab Specialist, UCSF

Danissa Coffey
SSRP Alumni
Graduate, UC Santa Cruz

Mikail Alejandro
SSRP Alumni
Graduate, USF & Propel Scholar UCSF

High School, March 3, 10am-12 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

Michelle Adutwun
SSRP Alumni
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SSRP Alumni
Undergraduate, UC Berkeley

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Assistant Professor, UCSF
Director of the International Zinc Nutrition Consultative Group

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Sandra Larkin
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Lisa Romero
Data Analyst, Student Liaison
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Program Manager, CHAMPS
UCSF Benioff Children's Hospital Oakland

Angel-Max Guerrero, MA
Pipeline Program Manager
Center for Science, Education & Outreach
Office of Diversity & Outreach
University of California, San Francisco

Summer Student Research Program Curriculum

Program Objectives:

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

Overview

The virtual curriculum provided during the 2023 Summer Student Research Program (SSRP) will consist of both **required** and **elective** content, which will be organized through the UCSF learning management system known as the Collaborative Learning Environment (CLE).

The **required curriculum** consists of synchronous and asynchronous programmatic lectures and videos, as well as research with your mentor. It is expected that these items combined with the research you will perform with your mentor will take approximately 20-30 hours per week. About 9 hours of required curriculum will be provided through synchronous Zoom sessions presented on Tuesdays & Thursdays from 2-5 pm. You are expected to be present and interactive for these synchronous Zoom sessions. Other required content, including your research design and proposal development, safety training, and assigned training modules will happen outside of the synchronous Zoom sessions at times of convenience for you and your mentor. It is important that you organize your time to complete these assignments without falling behind. Elements of 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** virtual 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 iBiology lecture videos. The individual events, including their dates and times when applicable, will be posted on the CLE.

Required Items to be Completed During First Week of the Program

Instructions and links to each training module are located on CLE.

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

Summer Student Research Program Curriculum

Weekly Required Curriculum

- Attendance at every Tuesday and Thursday Zoom lecture from 2-5pm PST.
- Participation in weekly journal club sessions on Tuesdays (during 2-5 pm session)
- View weekly assignments for iBiology & other videos posted on CLE. Viewing before lectures will have the maximum benefit. Discussions of videos will occur in small group sessions.

Programmatic Requirements for all students

- Fill out pre- and post-program online evaluations
- Turn in Research Proposal by **Wednesday, June 21st at 5:00 pm**
- Turn in Personal statement & headshots by **Wednesday, June 28th at 5:00 pm**
- Turn in Research abstract by **Wednesday, July 19 at 5:00 pm**
- Attend at least **ONE** office hour by **Friday, July 28th**
- Give 5 min oral presentation on **Thursday, August 3rd** (all day event via zoom)
- Attend final symposium on **Friday, August 4th,** 12:00 – 5:00 pm (in -person, tentative time)

Each funding program (NIH, CIRM & DDCF) also has their own specific requirements as well. These will be reviewed during orientation. Instructions and templates are located on CLE.

Elective Curriculum

- Weekly office hours with SSRP Program Leadership (Wednesdays, 4-5 pm)
- Grand rounds lectures at BCH-Oakland or UCSF West Bay
- Movie & reading suggestions that highlight important topics in STEM
- Additional enrichment material listed on CLE

Social Networking Opportunities

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

Applications Used in Virtual Programming

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

Program Contact Information

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

Summer Student Research Program Lecture Series 2023

Date	Event	Event Title	Speaker/Leader
Week 1	**Theme: Hematology**		
6/5/23	Orientation	2023 SSRP Orientation	SSRP Leadership
6/6/23	Tuesday SSRP Programming	Day in the life of a clincal research cordinator	Erin Rosales
		Bioethics: Case Studies	Ellen Fung, PhD; David Killilea, PhD
6/8/23	Thursday SSRP Programming	Sickle Cell Disease, drug therapy and pain	Ward Hagar, MD
		Sickle Cell Disease & COVID-19	Priya Parikh, MD
		Living with Sickle Cell Disease - a Patient's Perspective	Christelle Salomon
6/9/23	Basic Science Boot Camp	2023 SSRP Basic Science Bootcamp	David Killilea, PhD, Kathy Schultz, MS
Week 2	**Theme: Hematology**		
6/12/23	Make-up Orientation	2023 SSRP Orientation	Ellen Fung, PhD; David Killilea, PhD
6/13/23	ACHPP Career Workshop	Health Care Disparities	ACHPP Leadership
	Tuesday SSRP Programming	Day in the life of a graduate student	Eric Garcia
		Day in the life of a medical student	Troy Coaston
		Checking in - Acknowleging and Bringing Our Full Selves	Karen Daley, LMFT
6/14/23	ACHPP Career Workshop	Managing Emergencies & Basic CPR training	ACHPP Leadership
6/15/23	Stem Cell Workshop at UC Berkeley	2023 Stem Cell Workshop	Alison Killilea, PhD
	Thursday SSRP Programming	Journal Club 1	Ellen Fung, PhD; David Killilea, PhD
		Stem cell production	Brian Shy, PhD
		Stem cell applications	Lydia Sohn, PhD
Week 3	**Theme: Sports Medicine & Nutrition**		
6/20/23	Tuesday SSRP Programming	Journal Club 2	Amber Peake
		Day in the life of a social worker	Wendy Murphy, MSW
		Day in the life of a nutritionist	Mary Lesser, PhD RD
6/22/23	Thursday SSRP Programming	Ketogenic diet	Mariana Roan, MS RD
		Got Whole Wheat?	David Killilea, PhD

Summer Student Research Program
Lecture Series 2023

Week 4	**Theme: Infectious Disease**		
6/27/23	Tuesday SSRP Programming	Journal Club 3	Ali Odeh
		Day in the life of an emergency room physician	Jocelyn Garrick, MD
		Living with Long COVID-19	Lekshmi Santhosh, MD
6/29/23	Thursday SSRP Programming	Day in the life of an infectious disease researcher	David Sanders, PhD
Week 5	**Theme: Differently Abled Patients**		
7/6/23	Thursday SSRP Programming	Autistics as patients: what to expect and what not to assume	Janet Lawson, LMFT
		Brain development in girls with autism	Christine Wu Nordahl, PhD
Week 6	**Theme: Social Determinants of Health**		
7/11/23	Tuesday SSRP Programming	Journal Club 4	Erika Zagni
		Day in the life of a nurse	Molly Szczech, NP
		Increased morbidity & mortality in pregnant women of color	Martha Tesfalul, MD
7/13/23	Thursday SSRP Programming	How structural racism presents in patients with chronic pain	Oyebimpe Adesina, MD
		Day in the life of a physician focused on anti-racism	Bianca Argueza , MD
Week 7	**Theme: Community Health**		
7/18/23	Tuesday SSRP Programming	Journal Club 5	Israel Fuentes
		Day in the life of EMT	Skylar James, PA
		Addressing the Fentanyl crisis	Ayesha Appa, MD
7/20/23	Thursday SSRP Programming	Gender-diverse youth	Janet Lee, MD
		Immigrant health propgrams at UCSF	Raul Gutierrez , MD

Summer Student Research Program
Lecture Series 2023

Week 8	Theme: Alternative Therapeutics		
7/24/23	Kanbar/Career Panel	Clinical simulation	Bianca Argueza, MD
		Career Paths Panel - MS, RN, PhD, MD, & MD/PhD	
7/25/23	Tuesday SSRP Programming	Journal Club 6	Kayla Jones
		Day in the life of at a biotech	Tony Munoz
		How to Design a Poster & Give 5 Min Oral Presentation	David Killilea, PhD
7/27/23	Thursday SSRP Programming	Use of psychedelics in medicine	Joseph Zamaria, MD
		Improve sleep to improve health	Glenn Rosenbluth, MD
Week 9	**Theme: Wrapping it all up**		
8/1/23	Tuesday SSRP Programming	You made it! What to next …	Ellen Fung, PhD, David Killilea, PhD
		Office Hours & questions about final presentations	Ellen Fung, PhD, David Killilea, PhD
		Checking out - Acknowledging the Growth of The Process	Karen Daley, LMFT

Mentor Monday

Volume 1 | May 30, 2023

2023: Finding the STEM in ME

SSRP Mentor Monday

Program officially starts on Monday, June 5th - See below for upcoming details on programming this week. Thank you all for agreeing to mentor these talented youth!

Mentor Orientation

When: Wednesday May 31st
12:00 pm - 1:00 pm
Where: on Zoom, share this **LINK**
Agenda: Program Objectives & Logistics, Curriculum Details, Supply Reimbursement, Mentoring tips, Q & A

Mentor Workshop

When: Thursday, June 1st
12:00PM - 1:00PM
Where: on Zoom, share this **Link**
Agenda: Aligning Expectations

View Your Students Cu

Students will be using UCSF's Collaborative Learning
modules pertaining to our weekly themed lectures. A
abstracts, proposals, and personal statements will be
elective information such as grand rounds.
Here is the information for ***GUEST ACCESS***

Key dates:

- **All Student Orientation on Monday, June 5th: 10:00AM - 3:00 pm (PST) In-person**

Required activity that all students should attend unless unable due to final exams.

- **Make up Orientation: Monday June 12th at 1:00 pm (PST) - Zoom**

For those students who are still in school on June 5th

- **Official Program, June 5th to August 4th**
- **3 page Research Proposal Due:** June 21st by 5:00 pm
- **Research Symposium**, Friday August 4th at MLK Research Building, Time TBD
- **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.
- Most students are more successful with a structured learning environment. Map out your objectives, be concrete. Nothing is too basic. Clear objectives allow the student to feel successful and build on their successes.
- Have a weekly plan for your student and frequent check ins, particularly at the start of the program. If too busy, have a lab member meet with them some days.

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Student Orientation (in-person)

When: Monday June 5th
10:00am - 3:00 pm
Where: MLK Research Building

We will start off the program with an orientation for students next Monday, June 5th, 10am - 3 pm. This is an exception to our regular Tu/Th curricular training days. We will review curriculum and give tips to the students for how to be successful this summer. Please do not plan any meetings with your student during this time.

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

Research Ethics Training

All students are required to complete 2 modules of the CITI ethics training; Basic Human Subjects and RCR training by 6/9/23. We will be explaining this to the students in more detail the first week of the program, however, if you need students to start on their CITI training this week, please alert **Mrs. Roi Jennings**.

Onboarding & Communication

Your student should receive their UCSF email and access to UCSF drives/library etc. by Thursday, June 1st.

We have asked students to check their email regularly, but good to check in with

Volume 4 | July 10, 2023

Mentor Monday

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 attending their first SSRP social gathering. This is something that we have not been able to offer in recent years and are happy to bring communal gathering back into programming. Alumni are spearheading this effort and we hope to continue to help establish and maintain community with like minded peers

This week theme is "Social Determinants of Health." **Erika Zagni** (SSRP Alumni and current student) will start with presenting and walking us through a scientific journal article. SSRP Alumni **Molly Sczech** will talking to us about being a nursing student for our **Day in the Life series**. Then students will hear a talk by **Dr. Martha Tesfalul (UCSF)** on *"Examining Morbidity and Mortality in Pregnant Women of Color."* Thursday students will get to hear more flash talks from their peers. **Dr. Oyebimpe Odesina (UC Davis)** will give a talk on *"Structural Racism and Pain in Patients,"* with **Dr. Bianca Argueza (UCSF)** closing us out with a talk on *"Day in the Life of a Physician focused on Anti-Racism."*

Week 6 at a glance:

- 7/11 @ 2-5: Tuesday SSRP online seminars (required & on Zoom)
- 7/12 @ 4-5: SSRP Office Hours (optional & on Zoom)
- 7/13 @ 2-5: Thursday SSRP online seminars (required & on Zoom)

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: chori23

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 19th
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.
https://ucsf.box.com/s/d2pn3frh52j4xlyqv59n5a1ae2d8ein2

Mentor Reimbursements

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

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 email 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.

SSRP 42nd Annual Symposium Save the Date

When: Friday, August 4th
Time: 12:00PM - 5:00PM
Where: MLK Research Building
5700 Martin Luther King Jr Way
Oakland, CA 94609

SSRP is on Instagram!

Follow for weekly highlights from the program, students reflections on science can also be found on our SSRP instagram account: chorissrp

Key dates:

- **350 Word Abstract Due:** July 19th by 5:00 pm
- **Research Symposium**, Friday August 4th 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.
- Most students are more successful with a structured learning environment. Map out your objectives, be concrete. Nothing is too basic. Clear objectives allow the student to feel successful and build on their successes.
- Have a weekly plan for your student and frequent check ins, particularly at the start of the program. If too busy, have a lab member meet with them some days.
- Create a plan for 'what to do when finished.' This could be a Box folder with reading material and other projects to enhance their learning when they complete their weekly objectives

Fun-g Friday

Volume 1 | May 26, 2023

2023: Finding the STEM in ME

SSRP Fun-g Friday

Welcome SSRP 2023! The start of summer programming is just around the corner with in-person orientation scheduled for Monday, June 5th. This is just a sneak peek into what your summer may entail; **all of this information will be covered at orientation! Further questions?** Shoot Roi or Lisa an email at roialle.jennings@ucsf.edu or lisa.romero@ucsf.edu

SSRP Orientation

When: Monday, June 5, 2023 from 10AM-3PM (LUNCH PROVIDED)*
Where: 5700 MLK Jr. Way, Oakland, CA 94609
Fill out this 2 minute survey by Thursday, June 1st.

*If you are still in school on June 5th, drop leadership a line ASAP if you haven't already done so.

What to do before programming begins...

1. Reach out to your mentor if you haven't done so yet.
2. Fill out this 2 minute survey!
3. Read any materials sent over to you by your mentor.
4. Complete paperwork sent to you from HR (if not already done)
5. Check that your UCSF credentials work (Email & MyAccess)
6. Check your email every day!

Summer Curriculum

In addition to your research projects, there is a mandatory online component to the summer program. Specifics will be covered at orientation!

- We will convene **synchronously from 2PM-5PM Tuesdays and Thursdays** (except July 4th) on ZOOM.
- The program will utilize the online Collaborative Learning Environment (CLE), similar to Canvas/Blackboard. Once you have activated your UCSF credentials, you will be enrolled in the online modules!
- The program will communicate via Slack, under the "SSRP2023" channel. Sign up using this link.

Research Ethics Training

All students are required to complete research ethics training by 6/09/23. This training is provided through the "CITI- Human Subjects Protection Training" website, and takes roughly 4 hours to complete the required modules. We will be explaining this in more detail the first week of the program, however, some mentors may request you to complete this training ASAP. Email Ms. Jennings if you need links to this training before week 1.

Key Dates

- **In-Person All Student Orientation on Monday, June 5th: 1:00 - 3:00 pm (PST)** – *Required* activity that all students should attend unless unable due to final exams.
- **Make up Orientation: Monday June 12th at 1:00 pm (PST) -** *For those students who are still in school on June 5th*
- **Official Program, June 5th to August 4th** – Please put in your calendar to avoid any absences due to travel, vacation, etc.
- **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 mentor

We are so excited to meet you all very soon!
~Ellen, Marsha, David, Roi & Lisa

Fun-g Friday

Volume 6 | June 30, 2023

2023: Finding the STEM in ME

SSRP Fun-*g* Friday

Halfway through the summer already?! Highlights and updates included below with future opportunities beyond this summer!

Present at a UCSF Symposium!

UCSF Health Equity and Anti-Racism Research (HEAR) Symposium: **Call for Abstract Submissions**

The UCSF HEAR Symposium will be held in October, 2023. Submissions with themes pertaining to **health equity** are encouraged. Find out more information here. E-abstract submission deadline is Friday, July 7, 2023 via **this link**.

4th of July Holiday

UCSF is celebrating Independence Day on July 4th. There is no programming that Tuesday, and no one is expected to go in for their internship placements. July 3rd is NOT considered a holiday, so talk to your mentors about expectations for Monday.

Some cities in the Bay Area are hosting official firework shows on the 4th, including Antioch, San Francisco,

Flash Talks

- Students delivering 3 minute flash talks on **Thursday, 7/6** are:
  - Samina
  - Samirah
  - Linda
  - Eashani
  - Eirini
  - Jordan
  - Lilly

Job Opportunity- Rivers Lab (Apply by emailing Hart Horneman)

Description

The lab of Angela Rivers MD PhD at UCSF is searching for exceptionally motivated and enthusiastic research specialists. The lab is run by a practicing physician-scientist focused on sickle cell disease.. The lab focuses on using sickle cell mice and clinical blood samples to develop novel therapies for sickle cell disease The specialist will be an integral member of the research team; thus, the position will require a degree of independence but is still under general supervision. This type of experience is superb preparation for application to graduate or medical school. The position is a balancing act and requires an organized person with talent for multi-tasking, as there are three key components: • An exceptional candidate will lead their own independent project(s), develop new ideas, be familiar with the literature, and participate in procurement of funds, where appropriate. • Collaborate with other members on research projects (e.g. those involving hormone-sensitive cancer organoids) • Is expected to assist with day-to-day lab operations, perform general lab duties and be a positive lab citizen.

Required Qualifications:

• Must have (or be in process of obtaining) a bachelor's degree (or equivalent degree) or four years of research experience to be appointed at the Junior rank. • Excellent organizational and interpersonal communication skills (verbal and written) • Willingness and ability to learn new methods and skills for changing research priorities. • Ability to work independently and as a member of a research team. • Ability to prioritize tasks, coordinate work tasks with others, and meet multiple deadlines. • Flexibility to work occasionally in excess of 8 hours and/or on weekends • Ability to perform repetitive tasks routinely and precisely (plating cells, running samples etc.)

Preferred Qualifications: • Prior lab experience from academia or industry (beyond coursework) • familiarity with any of the following: mammalian cell culture, flow cytometry, microscopy, immunostaining, immunofluorescence, molecular biology, use of mouse

Supreme Court Decisions, Summer 2023

In the past 48 hours, the Supreme Court has released decisions rejecting affirmative action, backing a business opposed to same-sex marriage, and rejected the proposed student loan forgiveness plan. In the wake of these decisions, the SSRP leadership team extends its commitment to maintaining an inclusive environment that aims to rectify the historical, systemic biases that persist in the United States. UCSF Health has released a statement affirming its commitment to diversity, hosting a Grand Rounds lecture on July 25 regarding "Advancing Diversity Without Affirmative Action".
This program is a safe space for all students, aiming to protect all identities.

Professional Development

This week, Dr. Fung and Dr. Killilea addressed resume do's and don'ts and how to access research journals. Information and slides are available in CLE!

Add your peers on LinkedIn using the #LinkedIn chat on Slack. Maybe add leadership while you're at it...

- Ellen Fung
- David Killilea
- Roi Jennings
- Lisa Romero

Free Museum Days this Summer!

1. SFMoma: free first Thursdays for Bay Area residents. Reserve tickets 2 weeks in advance **here**.
2. deYoung Museum: free every Saturday for Bay Area residents, free the first Tuesday of the month, and $2 discount any day with proof of use of public transit
3. Legion of Honor: Free every Saturday for Bay Area residents
4. Asian Art Museum: Free every first Sunday of the month
5. California Academy of Science: Free for CA library card holders via **Discover & Go**
6. Museum of the African Diaspora: Free every second Saturday

Social Media/Pictures

SSRP is working on creating content and the visibility of our program to help future students like yourself find community in our program. Please feel free to send pictures from you at your sites or with your other cohort members doing science or having fun to Lisa Romero. Also be sure to follow our IG page @CHORISSRP.

Key Dates

- **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
- **Research Abstracts-** *Due Wednesday, July 19 at 9AM*
- **Kanbar Simulation Lab** - *Friday, July 24th at 9AM at CPMC in San Francisco*
- **Weekly Research Project Sessions** – to be worked out with you and your mentor

Roi's Reflection

week life has provided a few challenges that has been expansive in experience and a bit stressful. From supreme court rulings to having angst over an ever growing to do

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David's Dais

David's Dais

This week's theme is nutrition, so I'm going to talk a little science since nutrition is what I do now. But it didn't start that way. To be honest, my student-self thought of nutrition as super boring, just memorization of a bunch of vitamins and minerals, and the diseases caused by deficiencies that no one gets anymore. Scurvy, rickets, beriberi… who cares. But later in graduate school, I came across a paper showing that imbalances in iron could play a role in the disease I was studying (pulmonary hypertension). I only knew iron as a nutrient mineral needed for making heme, so it piqued my curiosity. Fast-forward a few years, and I decided to change my scientific career to learn as much about minerals as I could. I lucked into a job offer from a famous Berkeley scientist with a project on iron, yada yada yada, and now I'm sitting here writing this reflection. Totally not planned.

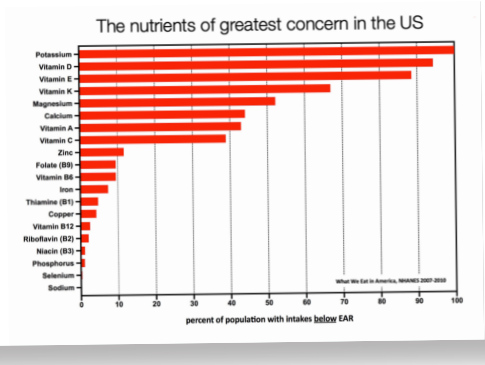
So why do I care about nutrition now? Besides the obvious point that food is fuel, the nutrients also take on amazing roles in our bodies, analogous to the spark plugs, wiring, pistons, and catalytic converters within the human chassis. Here are just a few examples…

Calcium is the most abundant metal in our bodies, accounting for about two pounds of our weight. While 99% of Ca is in our bone and teeth, the remaining 1% is critical for blood coagulation, muscle activation, gland secretions, and tons of other stuff. But the building of bone is a really special process, and not widely appreciated that bone formation completely stops in your twenties! That's not a typo. The bone mass you have to work with for the rest of your life locks in early, and all you can do is slow down the rate of loss as you age. Poor bone mass leads to risk of fractures, which in turn greatly reduces mobility resulting in depression, poor medical care, and early death. The rate of bone loss is influenced by genetics, but also by factors you can control like exercise, smoking, and nutrient intake. Besides calcium, you also need an adequate supply of magnesium, zinc, and vitamin D for healthy bones!

Potassium and sodium are interesting minerals that have an entangled relationship with human health. Potassium is the predominant monovalent mineral in plants, so used to be easy to get enough of. Sodium was much more limiting, requiring some effort for our hunter-gatherer ancestors to get enough. (There's an amazing story of African Elephants that risk ambush and death in a cave just to reach a rich

sodium deposit!). But in a couple of human generations, we have completely flipped that relationship on its head. Now the average American consumes over 3g sodium per day, when the upper limit of sodium listed as 2.3g (which is only 1 teaspoon!). Potassium is now one of the most deficient nutrients in the Western diet, mainly due to lower consumption of fruits & veggies. It's estimated that many thousands of lives would be saved each year if the ratio of potassium and sodium was restored to healthy levels. Think about that before your next order of French fries!

I could go on and on. There's the fact that humans evolved with poor iron intake (cause it was hard to kill sources of meat) such that our bodies never needed a mechanism to get rid of excess iron. In modern times, that's a problem because most men and post-menopausal women eat lots of meat and take in more iron than is healthy. This is also the major problem for patients with Sickle Cell Disease, as the high level of RBC rupture dumps a huge amount of iron into the body which eventual degrades the function of multiple organs, esp the heart. Oh, and then there are minerals like boron, silicon, lithium, and vanadium that are thought to be beneficial but have no clear function or mechanism It's 2023, and we don't even have a complete part list for the human body! On top of that, nutritional deficiencies continue to be a public health problem. Remember those diseases that 'no one gets'? Can you believe that we have started seeing rickets again in our hospital due to severe deficiency in vitamin within some kids? See… nutrition is not boring.

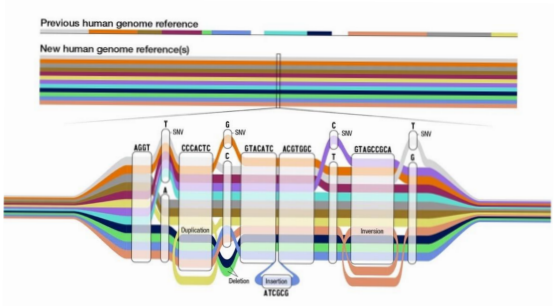


David's Dais

When I started graduate school, I first learned about the Human Genome Project to create a reference human DNA library which could be used to identify disease and open the doors to personalized medicine. While I understood the value, it seemed so impractical – sequencing genetic material took so long at that time and was projected to cost many millions just for a single person! Despite (still) being the world's largest collaborative biological project, I soon stopped following the project and it passed out of my thoughts.

Later, I moved to Children's Hospital Oakland Research Institute (CHORI), what is now the UCSF MLK Research Building. Sometime in 2003, there was a sudden excitement in the scientific community as President Clinton and other VIPs announced the first draft of the human genome. But there was also something else at CHORI – pride – because one of our scientists had contributed ~80% of the DNA libraries needed for this work. I was shocked, and a little embarrassed, that I had no idea. By being so focused on my interests, I had completely missed that hugely impactful work was going on around me in my own scientific home! I wondered what great discussions or opportunities I had missed out on.

These thoughts came back when reflecting on the theme of this week. Why? Well, the first human genome came mostly from a single anonymous male donor from Buffalo, New York. The scientists had intended to have a better mixed sample, but many of the other DNA libraries had quality issues. So some guy (I imagine some Buffalo Bills fan with no shirt in mid-winter with a fistful of spicy wings, jk, or not) is now called 'normal' to which all other human sequences will be compared. Well about 2 months ago, things got better by the announcement of the first human "pangenome" reference from 47 diverse individuals, with plan to reach 350 people by mid-2024. This better capture of human diversity will bring next-levels insights to human genomics, help diagnose disease, predict biological outcomes, and guide medical treatments. I guess I'll pay more attention now.



David's Dais

Volume 6 | June 30, 2023

Roi's Reflection

This week life has provided a few challenges that has been expansive in experience and also a bit stressful. From supreme court rulings to having angst over an ever growing to do list.

In these moments I like to remind myself to center and just breathe. One of my favorite breathing techniques is an Ayurvedic form of breath-work that originated in India called 4 square or Box breathing. Its done to a 4 count and you can repeat it as many times as you'd like.

I invite you all to try it as well.

I like to find my center by sitting in an upright position placing one hand on my naval and the other on my heart space and allowing my feet to find and ground to the floor (but please do whatever position feels most intuitive for you).

Now try breathing in to the count of four. Holding that breath to the count of four. Then exhaling (making sure that your belly is going towards the back of your spine) as you breathe out to the count of four. Again holding your lungs empty for the count of four. Repeat.

This is a great deep breathing technique that can help settle the nervous system; reducing overall stress and anxiety of the mind and body. It also is a great tools for refocusing and coming back to your internal center. I hope you find this offering as helpful as I did.

David's Dais

I write this just after the SCOTUS ruling that race-based college admissions are unlawful. Given the make-up of this court, the decision isn't too surprising but still creates a major change for the social justice movement in our country. This decision will affect many of you about to apply for colleges, and may be understandably stressful. I was heartened to hear general agreement from both conservative and progressive voices that a student should be seen as their whole person, and their lived experience be considered and respected. This decision shifts the burden of social balance to the colleges, and as one commenter said this morning – we will soon see which institutes really care about diversity & equity.

I've read several interesting takes on this decision, from Clarence Thomas to Michelle Obama. But most moving was from Justice Brown Jackson: "Deeming race irrelevant in law does not make it so in life. And having so detached itself from this country's actual past and present experiences, the Court has now been lured into interfering with the crucial work that UNC and other institutions of higher learning are doing to solve America's real-world problems… No one benefits from ignorance. Although formal race-linked legal barriers are gone, race still matters to the lived experiences of all Americans in innumerable ways, and today's ruling makes things worse, not better. The best that can be said of the majority's perspective is that it proceeds (ostrich-like) from the hope that preventing consideration of race will end racism. But if that is its motivation, the majority proceeds in vain. If the colleges of this country are required to ignore a thing that matters, it will not just go away. It will take longer for racism to leave us. And, ultimately, ignoring race just makes it matter more… The only way out of this morass — for all of us — is to stare at racial disparity unblinkingly, and then do what evidence and experts tell us is required to level the playing field and march forward together, collectively striving to achieve true equality for all Americans."

This morning, several commentators made the point that when California voted for Proposition 209 (prevents considering race/ethnicity in public education), there was a sharp decrease in apps from BIPOC applicants, including in the sciences. Research into retention in STEM often report common themes of "I don't see anyone else that looks like me, so maybe I don't belong here" or "I'm the only BIPOC here, so I can't make a mistake and make us look bad." But you don't just belong, we need you! BIPOC student success is vital to better serve our increasingly changing society. Study after study shows more diverse teams generate stronger & faster clinical solutions and more creative & impactful research discoveries. The social justice movement is inefficient, but eventually self-corrects – don't let it slow you down. You have talent, you are capable, you belong, and you are needed.

David's Dais

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~Ellen, Marsha, David, Roi & Lisa

Weekly Journal Clubs

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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 gut-colonized (conventional and microbial and physical properties of feces from germ-free and gut-colonized (conventional and conventionalized) mice. The gut-colonization associated differences were ass DNA, bacterial-PCR, scanning electron microscopy, FACS, thermogravimetry Based on the differences in buoyancy of feces, we developed levô in fimo test sinking feces (sinkers) of germ-free mice from floating feces (floaters) of gut-c simultaneous tracking of microbiota densities and gut colonization kinetics ir we provide first direct evidence of causal relationship between gut microbial floatation. Rare discordance in LIFT and microbiota density indicated that er gut colonizers may be necessary for fecal floatation. Finally, fecal metageno from conventional and syngeneic fecal transplanted mice identified coloniza bacterial species including highly prevalent *B. ovatus*, an anaerobic commer flatulence and intestinal bowel diseases. The findings reported here will imp food microbial biotransformation and gut microbial regulators of fecal float disease.

Abbreviations

FMT	Fecal microbiota transplant
LIFT	Levô 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

JAMA Network | Open

Research Letter | Pediatrics

Prevalence of Mental Health Diagnoses in Commercially Insured Children and Adolescents in the US Before and During the COVID-19 Pandemic

Loreen Straub, MD, MS; Brian T. Bateman, MD, MS; Seanna Vine, MPH; Krista F. Huybrechts, MS, PhD

Introduction

In 2021, several pediatric health organizations declared a state of emergency due to the perception that mental health (MH) conditions were increasing among youths, seemingly exacerbated by the COVID-19 pandemic.[1] The COVID-19 pandemic caused disruptions in daily life, social isolation, family economic burden, increased social media engagement, and reduced access to care, all of which might have negative associations with MH. To our knowledge, no nationwide data evaluating trends in pediatric MH diagnoses during the pandemic, stratified by age and sex, are currently available for the US.[2-5]

Methods

This cross-sectional study was approved by the institutional review board of Brigham and Women's Hospital, with a waiver of informed consent because the data were deidentified. This study follows the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline.

Using a geographically diverse commercial health care claims database (Optum deidentified Clinformatics Data Mart Database; eAppendix in Supplement 1), we assessed the monthly proportion of youths, stratified by age and sex, who received an MH diagnosis between January 2018 and March 2022. We considered the following commonly diagnosed groups of MH conditions in pediatric patients aged 6 to 18 years in our cohort: anxiety disorders, attention-deficit/hyperactivity disorder

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

May 22, 2023 1/5

frontiers in Neuroscience

ORIGINAL RESEARCH
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Sleep-Aware Adaptive Deep Brain Stimulation Control: Chronic Use at Home With Dual Independent Linear Discriminate Detectors

Ro'ee Gilron[1], Simon Little[2], Robert Wilt[1], Randy Perrone[1], Juan Anso[1] and Philip A. Starr[1]

[1] Department of Neurological Surgery, University of California San Francisco, San Francisco, CA, United States,
[2] Department of Neurology, University of California San Francisco, San Francisco, CA, United States

Adaptive deep brain stimulation (aDBS) is a promising new technology with increasing use in experimental trials to treat a diverse array of indications such as movement disorders (Parkinson's disease, essential tremor), psychiatric disorders (depression, OCD), chronic pain and epilepsy. In many aDBS trials, a neural biomarker of interest is compared with a predefined threshold and stimulation amplitude is adjusted accordingly. Across indications and implant locations, potential biomarkers are greatly influenced by sleep. Successful chronic embedded adaptive detectors must incorporate a strategy to account for sleep, to avoid unwanted or unexpected algorithm behavior. Here, we show a dual algorithm desig [illegible] independent detectors, one used to track sleep state (wake/sleep) an [illegible] motor state (medication-induced fluctuations). our detector successfully transitio [illegible] resumed motor state tracking w aDBS algorithms may prove cruci aDBS algorithms.

Keywords: DBS (deep brain stimulation), F

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INTRODUCTION

Commercially available sensing er [illegible] used to treat epilepsy [Neuropace obsessive-compulsive disorder (M Jimenez-Shahed, 2021; Thenaisie e cortically or subcortically and ar sensed brain activity (Gunduz et neural biomarker of interest is ty bands in the frequency domain, et al., 2019; Yin et al., 2021). I stimulation current is adjusted l are now routinely tested not onl

As studies transition from b to consider that sleep has a is typically disturbed in n

The Journal of Clinical Endocrinology & Metabolism, 2023, 00, 1–11
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Advance access publication 13 April 2023
Clinical Research Article

ENDOCRINE SOCIETY | OXFORD

Low Vitamin D Levels Are Associated With Long COVID Syndrome in COVID-19 Survivors

Luigi di Filippo,[1] Stefano Frara,[1] Fabrizio Nannipieri,[2] Alice Cotellessa,[3] Massimo Locatelli,[3] Patrizia Rovere Querini,[4] and Andrea Giustina[1]

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Correspondence: Andrea Giustina, MD, Institute of Endocrine and Metabolic Sciences, Università Vita-Salute San Raffaele, IRCCS Ospedale San Raffaele, via Olgettina 60, Milan 20132, Italy. Email: giustina.andrea@hsr.it.

Abstract

Context: Long COVID is an emerging syndrome affecting 50% to 70% of COVID-19 survivors that still lacks predicting factors.

Objective: Due to the extraskeletal effects of vitamin D, we retrospectively assessed the association between 25(OH) vitamin D levels and long COVID in COVID-19 survivors 6 months after hospitalization.

Methods: Long COVID was defined according to NICE guidelines. Fifty long COVID and 50 non–long-COVID subjects matched on a 1:1 basis were enrolled from an outpatient clinic post-COVID cohort seen from August to November 2020. Therapies/comorbidities affecting calcium/vitamin D/bone metabolism, and/or admission to the intensive care unit during hospitalization were exclusion criteria. 25(OH) Vitamin D was measured at hospital admission and 6 months after discharge.

Results: We observed lower 25(OH) vitamin D levels, evaluated at follow-up, in subjects with long COVID than those without (20.1 vs 23.2 ng/mL, $P = .031$). Regarding the affected health areas evaluated in the entire cohort, we observed lower 25(OH) vitamin D levels in those with neurocognitive symptoms at follow-up ($n = 7$) than those without ($n = 93$) (14.6 vs 20.6 ng/mL, $P = .042$). In patients presenting vitamin D deficiency (<20 ng/mL), both at admission and at follow-up ($n = 42$), those affected by long COVID ($n = 20$) (12.7 vs 15.2 ng/mL, $P = .041$). In multiple regression analyses, lower 25(OH) vitamin D levels at follow-up than those not affected ($n = 22$) presented lower hospital admission and 6 months after discharge. In patients presenting with long COVID in our cohort ($P = .008$, OR 1.09, CI 1.01-1.16).

Conclusion: COVID-19 survivors with long COVID have lower 25(OH) vitamin D levels than matched patients without long COVID. Our data suggest that vitamin D levels should be evaluated in COVID-19 patients after hospital discharge. The role of vitamin D supplementation as a preventive strategy of COVID-19 sequelae should be tested in randomized controlled trials.

Key Words: COVID-19, vitamin D, Long COVID, SARS-CoV-2, hypovitaminosis D

Abbreviations: BMI, body mass index; COVID-19, Coronavirus disease-19; CRP, C-reactive protein; LDH, lactate dehydrogenase; NIMV, noninvasive mechanical ventilation.

The negative role of lower vitamin D levels in patients affected by Coronavirus disease-19 (COVID-19) was reported early to be a possible risk factor for worse acute clinical outcomes (1). Several retrospective case–control studies, meta-analyses, including observational and interventional studies, as well as prospective studies consistently revealed inverse associations between serum vitamin D levels and the risk of developing acute severe COVID-19 with an increased risk of mortality, intensive care unit (ICU) admission, length of ICU stay, and need for mechanical ventilation (2-10).

After the first pandemic wave, emerging evidence observed early that patients previously affected by SARS-CoV-2 infection often reported several persistent clinical symptoms and signs, even for long periods after the acute disease, with a marked impairment of their quality of life (11). The concomitant presence of multiple and different persistent symptoms continuing for more than 12 weeks after acute COVID-19 was early denominated as long COVID syndrome (12, 13). This syndrome was described to involve different health systems in patients, including neurocognitive, cardiorespiratory, gastrointestinal, constitutional, and musculoskeletal areas, and taste and smell disorders (11). To date, most of published studies on long COVID suggest that in 50% to 70% of COVID-19 survivors several post-COVID symptoms can be observed up to 3 months after acute disease (11). However, to date, the predisposing factors for this syndrome are still poorly understood. A meta-analysis including 20 articles and involving 13 340 patients highlighted the role of female sex and severity of acute disease as independent prognostic factors for long-term sequelae (14). Similarly,

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SHORT REPORT

Food insecurity and frailty among women with an in the United States: a cross-sectional analysis

Judy Y Tan[1,§], Lila A Sheira[2], Edward A Frongillo[3], Deborah Gustafson[4], Anjali Sharm Mardge H Cohen[7], Elizabeth Golub[8], Andrew Edmonds[9], Igho Ofotokun[10,11], Margaret Deborah Konkle-Parker[13], Torsten Neilands[1], Phyllis Tien[14] and Sheri D Weiser[1,2]

[§]**Corresponding author:** Judy Y Tan, Division of Prevention Science, University of California, San Francisco, UCSF Bo Francisco, California 94143, USA. Tel: +1 415-502-1000 ext. 17163 (vm only). (judy.tan@ucsf.edu)

Abstract

Introduction: Frailty is frequently observed among people with HIV, and food insecurity is a eral population. Evidence is scarce on the associations between food insecurity and frailty ar be particularly vulnerable to the impacts of food insecurity. The goal of this study was to a insecurity and frailty among women with and without HIV.

Methods: There were 1265 participants from the Women's Interagency HIV Study who par 2017. Frailty was measured using the Fried Frailty Phenotype, and women were subsequent or frail. Food insecurity was assessed using the U.S. Household Food Security Survey Module ing high, marginal, low or very low food security. Multinomial logistic regression models w sectional associations between food insecurity and frailty while adjusting for socio-demogr covariates.

Results and discussion: Approximately one-third (31.9%) of the women had marginal, low or very low food security, and the proportions of women who met the criteria for frailty or pre-frailty were 55.6% and 12.4% respectively. In the adjusted model, the relative risk ratio (RRR) of frailty for women with very low food security versus women with high food security was 3.37 (95% CI [1.38 to 8.24], $p < 0.01$); the corresponding RRR of pre-frailty was 3.63 (95% CI [1.76 to 7.51], $p < 0.001$). Higher annual household income was associated with lower RRRs of frailty or pre-frailty ($p < 0.01$). Similarly, older age was associated with more frequent frailty (RRR=1.06, 95% CI [1.03 to 1.09], $p < 0.001$). HIV serostatus was not significantly associated with either pre-frailty (RRR=0.97, 95% CI [0.71 to 1.31]) or frailty (RRR=0.75, 95% CI [0.48 to 1.16]).

Conclusions: Very low food security was associated with more frequent frailty and pre-frailty among women with and without for HIV. HIV serostatus was not associated with frailty.

Keywords: Food insecurity; frailty; HIV; women

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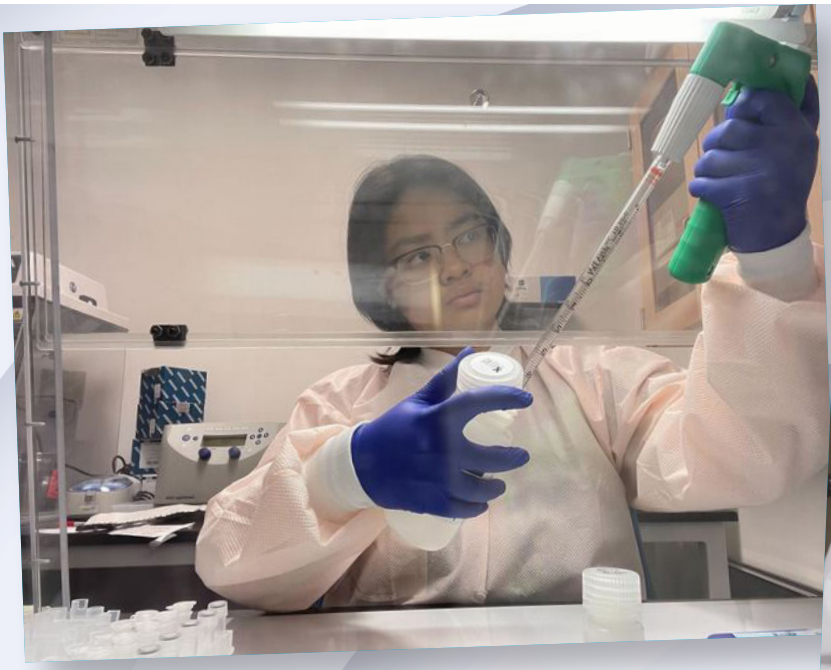
1 | INTRODUCTION

Food insecurity, or having limited access or ability to procure nutritional foods in socially acceptable ways [1], is associated with frailty, a multidimensional phenotype characterized by reduced strength, endurance and physiologic function [2]. Food insecurity and frailty are associated with lower daily energy intake, greater likelihood of obesity or being abnormal weight and poorer nutritional status overall [3,4]. These characteristics are associated with greater risks for further health decline [5-7].

Frailty is prevalent among people with HIV, but there are limited data on food insecurity and frailty within the context of HIV [8-13]. Frailty is commonly assessed using the Fried Frailty Phenotype criteria, composed of weight loss, exhaustion, physical inactivity, slow walking speed and weak grip strength. Individuals with three or more of these criteria are characterized as frail, those with one or two as pre-frail and those with none as robust [2]. Many people with HIV experience health complications observed among the elderly in the general population but at an earlier age (i.e. 50 years) [14,15]. The premature aging may be due to HIV disease itself, antiretroviral treatment toxicity or chronic inflammation, contributing to the phenomenon of accelerated aging [14,15]. It is also possible that the high prevalence of premature age-related conditions is due to non-HIV-related factors, such as social or behavioural factors [16]. As a key contributor to poor quality of life and functional status, frailty is associated with adverse outcomes among people with HIV, including fractures, falls and mortality [16-19]. Frailty is also associated with lower



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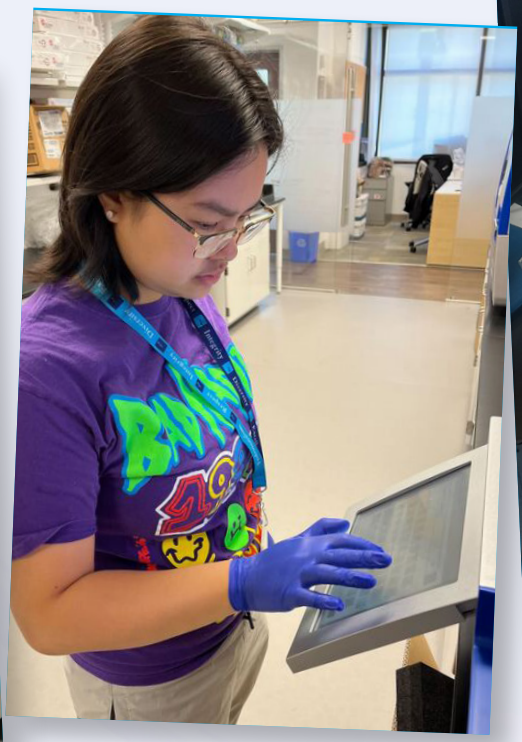

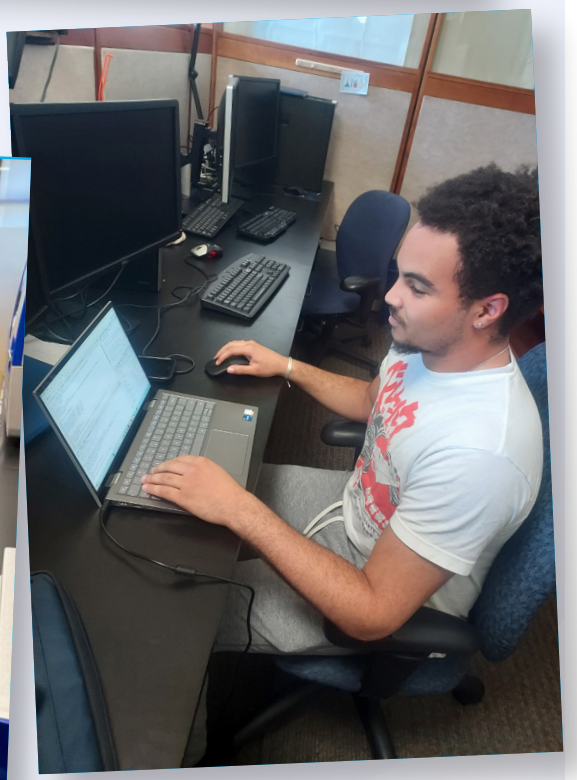

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Margo Azzam

Kinetics of Lipid Accumulation in NASH Patient iPSCs versus iHeps

Mentor: Aras Mattis, MD PhD

Hi! My name is Margo Azzam and this fall I'll be entering my senior year of high school. I'm currently interested in molecular biology and biochemistry. Although I've decided that this is what I would like to study in college, I'm much less clear about where I'd like to take that knowledge or what kind of career I want to pursue. I hoped that through SSRP I could gain experience working in a lab, and that it would help me understand what a career in research is like. I'm so grateful for my mentor, Dr. Aras Mattis, for welcoming me into his lab and allowing me to be so directly involved in the lab's work. Working in the lab has given me a much clearer image of what research is like in a laboratory setting, and I've loved being able to apply and expand my science knowledge through SSRP.

INTRODUCTION

Nonalcoholic Steatohepatitis (NASH) is a more severe, irreversible stage of Nonalcoholic Fatty Liver Disease (NAFLD) that affects ~10% of adults in the U.S. Molecularly, NAFLD is characterized by steatosis (amassing of intracellular fat) in at least 5% of its hepatocytes (the liver's primary cells). Excessive fat buildup in hepatocytes disrupts normal liver functions such as carbohydrate metabolism or protein synthesis. Intracellular lipid results in ER (endoplasmic reticulum) stress and drives hepatic inflammation. Once the liver develops inflammation, it is considered NASH.

OBJECTIVE

This project aims to explore how genetic NASH affects induced Pluripotent Stem Cell (iPSC) behavior.

METHODS

Four cell lines will be analyzed in vitro: a healthy (non-NASH) iPSC line, a NASH-containing iPSC line, and two iHep (iPSC-derived hepatocyte) lines-- one containing NASH and one without. Each cell line will be challenged with three different concentrations of oleate (lipids), and plates will be analyzed by cellular imaging in 2 hour increments, simulating different oleate exposure times. The amount of lipids accumulated will be determined by staining with Hoechst and BODIPY dyes and an analysis of the dye concentration using fluorescent imaging. This process will be done with a programmed BioTek instrument which automatically adds the oleate solution, media and dye; as well as incubation, washing, and cellular imaging. This instrument will operate a 72-hour protocol.

ANTICIPATED RESULTS

NASH patient iPSCs and iHeps may accumulate lipids faster and have increased quantitative lipids by the end of the experiment.

SIGNIFICANCE

Although NASH is a severe condition which is damaging to the liver, its direct causes are largely unknown. It is associated with diabetes and obesity but may be genetically inherited. Findings from this study could help confirm that NASH is a heritable disease. Previous research has been done investigating hepatocyte behavior with NASH, though there is limited work analyzing NASH in stem cells. This research aims to understand the disease in that aspect. Once NASH's function and molecular mechanisms are more established, this knowledge can be used to develop medical solutions for patients with NASH, and iPSCs eventually could be used to regenerate healthy liver cells.

Jasleen Bains

Factors Associated with Clinical Outcomes in Patients with Tuberculous Meningitis from Masaka, Uganda

Mentor: Felicia Chow, MD MAS

Hello! My name is Jasleen Bains and I am a rising junior at UC Berkeley majoring in Microbial Biology with a minor in Global Poverty and Practice. During my time at Cal, I have served as co-President for a student-run organization (BPSHI) that hosts free clinics to address the intersectionality between primary care services and health education within the underserved Punjabi community. Additionally, my involvement in ULAB and the Biology Scholars Program allowed me to further explore my interest in science. These experiences fueled my desire to participate in research that contributes to improving clinical outcomes for participants, resulting in better quality of life. This summer, I had the pleasure of working in the neuro-infectious diseases division at UCSF Parnassus with the generous support of Dr. Felicia Chow. After graduation, I hope to pursue a career in medicine as an aspiring physician. I thank both my mentor and SSRP for this valuable experience!

INTRODUCTION

Tuberculous Meningitis (TBM), an infection of the tissues covering the brain and spinal cord (meninges), is one of the most severe forms of tuberculosis. TBM accounts for about 6% of all cases of extrapulmonary tuberculosis worldwide, with an estimated 100,000 cases occurring per year. Even with appropriate treatment, mortality rates are high, especially for patients coinfected with HIV, for whom mortality can exceed 50%. Furthermore, patients who survive often experience neurological disability that impacts their day-to-day function.

OBJECTIVE

The primary objective of this study is to identify factors associated with clinical outcomes in patients with TBM.

METHODS

We will perform a secondary analysis of data collected in a parent study that evaluated adjunctive linezolid with standard or high dose rifampin for the first 4 weeks of therapy for patients with TBM. At the baseline screening visit, data were collected on demographics, clinical symptoms, and medication history. A neurologic examination was performed to assess severity of infection, defined as grade 1 (mild), grade 2 (moderate), and grade 3 (severe). In addition, blood laboratories, including CD4 cell count, and a lumbar puncture was performed. The primary endpoint was survival at 24 weeks and functional outcome, measured by the Modified Rankin Scale, performed at Week 4, 12, and 24. We will use multivariable logistic regression models to identify factors associated with mortality and functional outcome.

ANTICIPATED RESULTS

We anticipate that individuals who are older and have more severe TBM at presentation will experience worse clinical outcomes.

SIGNIFICANCE

The findings of this study will have an impact on the health of individuals in locations with high rates of TBM. Understanding factors associated with mortality and poor function in TBM will enable us to identify potential targets for intervention to improve outcomes in this devastating infection.

Julia Batkhuu

Investigating the Role of the Nucleus Accumbens in Social Attachment

Mentor: Kimberly Long, PhD

As a first generation student from an underrepresented third world country whose family suffered from inadequate healthcare, it has been a life-long mission to assist in addressing health disparities, advocating for patient rights, and promoting inclusive healthcare. After suddenly losing my grandfather, I immersed myself in the medical field to better understand my grandpa's health circumstances. I applied to rigorous medical internships, where I divided my 8-hour shifts to rotate to each patient and dedicate my empathy to their needs. Through these medical experiences and empathetic connections, I felt like I was helping my grandpa. Though I am grateful for those experiences, I felt confined to my unceasing curiosity as I realized I was more interested in the how and why of many of the diseases the patients had. Through CHORI SSRP, I have been able to investigate my interest in neuroscience in a diverse, open-minded, eager, and reliable environment. I am immensely grateful for the guidance and support of my mentor, Dr. Kimberly Long, who has been by my side every step of the way. After completing my bachelor's degree, I am considering pursuing PA school and, thanks to CHORI SSRP, I am also enticed by the prospects of biomedical research.

INTRODUCTION

Whether it's making new friends or growing closer to siblings, social attachments hold deep significance to our species. However, our knowledge of the neural and molecular mechanisms that underlie social attachment is limited. Previous work in the socially monogamous prairie vole suggests that the nucleus accumbens (NAc) is a key region for neuromodulator regulation of social attachment; however, the role of the NAc itself for social attachment is unknown.

OBJECTIVE

The objective of this project is to investigate the role of the NAc in facilitating social attachment. We hypothesize that enhancing NAc activity will increase pair bonding behavior, while suppressing NAc activity will decrease pair bonding behavior.

METHODS

To manipulate NAc neural activity, we virally expressed either excitatory or inhibitory chemogenetic receptors in the NAc of male prairie voles and provided a behavioral stimulus and/or the chemogenetic receptor ligand clozapine N oxide (CNO) to excite or inhibit neurons. First, we test proof of principle by determining whether chemogenetic receptors successfully activated or inhibited neural activity in the NAc via immunohistochemistry for the immediate early gene c-Fos. Next, we test whether manipulation of NAc activity changes pair bonding behavior by quantifying the behavioral preference for a bonded partner or novel stranger in male voles injected with CNO.

ANTICIPATED RESULTS

We anticipate that chemogenetic manipulation will functionally alter neuronal activity in our voles, and we anticipate that changing NAc activity will change vole behavior. Increasing neural activity in the NAc may increase the display of partner preference while silencing NAc activity may lead to more isolated or promiscuous behavior.

SIGNIFICANCE

The results of this study will provide new insights into the neural mechanisms of human social behavior by exploring the contribution and significance of NAc neural activity.

Alina Chen

Identification of Novel Regulators of the MMP1 Signaling Pathway in Hepatic Fibrosis

Mentor: Jennifer Y. Chen, MD
Contributing Authors: Sachin Sharma, PhD

Hi! My name is Alina. I am a rising senior at UC Berkeley double-majoring in Molecular Cell Biology and Psychology. As a first-generation university student, I have always been interested in the intersection between the medical world and the integration of medicine within diverse cultural backgrounds. While I have worked in many different clinical settings interacting with patients, my curiosity in understanding the underlying mechanisms of diseases remained. That's why this summer, I am beyond thankful to continue working with my amazing mentors, Dr. Jennifer Y. Chen and Dr. Sachin Sharma, at UCSF Parnassus to investigate the pathway leading to liver fibrosis with the help of SSRP. I believe that this experience will be transformative in parallel with my prior experiences in seeing how each step in the medical system works together from uncovering a disease's pathway to drug development, and finally, patient administration. Just as important, this will also help me better understand how to best incorporate cultural sensitivity into my career in the field of medicine down the line!

INTRODUCTION

Fibrosis, characterized by excessive extracellular matrix (ECM) deposition and impaired remodeling, results in significant morbidity and mortality, and treatment options remain sparse. In particular, strategies to promote collagen degradation and ECM remodeling to ameliorate fibrosis are limited. We previously identified the enzyme acid ceramidase (aCDase) as an antifibrotic target in hepatic fibrosis and observed that aCDase inhibition reduced matrix stiffness and attenuated fibrosis in models where fibrosis was already established.

OBJECTIVE

We aimed to elucidate mechanisms of ceramide-mediated ECM remodeling in HSCs and characterize the role of aCDase deletion in HSCs on ECM remodeling and fibrosis resolution in vivo.

METHODS

We modeled HSC activation in vitro by culture on plastic and in vivo by treatment with CCl4 for 4 weeks. We treated HSCs with ceramide in culture, and profiled treated samples by RNA sequencing, proteomics, and phosphoproteomics; in vivo, to evaluate the impact of ceramide-mediated ECM remodeling in the context of established fibrosis, we generated an inducible HSC-specific deletion of aCDase (Asah1flox/flox; Ai14; Col1a2-CreER = Asah1Icko). Collagen degradation was analyzed by immunostaining with a neoepitope antibody that recognizes degraded type 1 collagen (3/4 fragment); second harmonic generation microscopy; and collagen hybridizing peptide. Fibrosis was measured by hydroxyproline and Sirius red staining.

RESULTS

Our results show that in vitro, ceramide promotes PRKCα-ERK1/2-AP1-MMP1 signaling to increase collagen degradation and ECM remodeling in HSCs. In vivo, inducible deletion of aCDase in CCl4-treated mice increased MMP1 levels and collagen degradation, resulting in amelioration of fibrosis.

SIGNIFICANCE

These findings support aCDase inhibition as a treatment to reverse fibrosis, which can help facilitate new therapies in patients with chronic liver disease.

Daniel Chiarelli

Improving Testing and Care Accessibility Can Reduce the Risk to Vulnerable Populations from Tuberculosis Infection

Mentor: Mai Baalbaki, MD MSc

My name is Daniel Chiarelli and I am a rising senior at San Ramon Valley High School. I have always been excited by my science courses, but it wasn't until my junior year AP Biology class, that I started to become really passionate about the sciences and their careers. As an African-American, I have been aware of the healthcare inequities that unfairly affect communities across the country. Those deep-rooted inequities further motivated me to be a part of making a difference in my community. I am grateful to have been given the opportunity to participate in the CHORI Student Summer Research program this summer. The program has been an amazing experience. I have been given the opportunity to see firsthand how healthcare inequities affect underserved communities and how taking action can positively affect patient outcomes. I would like to thank my mentor, Dr. Mai Baalbaki for her support and guidance this summer.

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by Mycobacterium tuberculosis. Infection occurs via aerosol and inhalation. TB can exist for years in a non-infectious state called latent TB. If the host is immunocompromised, latent can turn into active TB. In 2020, 59 cases of active TB were reported in San Francisco alone, possibly millions have unreported latent TB. The highest risk populations for active TB are those who are low-income, unstably housed, or uninsured because of their lack of access to testing.

HYPOTHESIS

Utilizing patient surveys to assess accessibility and identify care barriers can enhance the effectiveness of TB testing and treatment, resulting in improved patient outcomes and a more equitable distribution of healthcare services.

METHODS

We developed a comprehensive patient survey to evaluate the accessibility of TB care for current patients at the Berkeley Free Clinic using descriptive statistics to tabulate study data on patient demographics and clinical needs. We will formulate a medical protocol to risk stratify patients after latent tuberculosis infection diagnosis.

ANTICIPATED RESULTS

We expect to see patients at the Berkeley Free Clinic who aren't receiving the proper care for Tuberculosis because of their lack of insurance, financial hardships, language barriers, or other reasons. We anticipate many barriers to care that will be made known and improved. The survey will help the clinic determine what things need to change and how to do so.

SIGNIFICANCE

Timely diagnosis and treatment of TB is crucial to prevent its spread and reduce the risk of complications or death. Some people are unable to access care and are left to live with the disease. Accessible TB testing ensures that individuals with symptoms or potential exposure can get tested promptly, leading to early detection and initiation of appropriate treatment. Accessible testing allows for early identification of TB cases, which can lead to timely recovery as TB is easier to treat when latent rather than active.

Kayla Chin

Inflammatory bowel disease and Chronic Recurrent Multifocal Osteomyelitis: A Single center case series

Mentor: Sabina Ali, MD

Hello! My name is Kayla Chin and I am a rising senior at Alameda and Science Technology Institute High School. Ever since I was younger, I have always had an interest in science and dreamed of working in public health. My passion for healthcare grew even larger after my healthy father had a stroke which made speech and movement difficult while also the cause of the stroke remains unknown. From this interest, I am currently working towards my high school diploma as well as an IGETC and an Associates Degree in Natural Science at local community colleges and plan on pursuing medicine throughout college with an overall goal to become a neurologist or ER doctor. Through the UCSF Summer Student Research Program, it has allowed me to explore different areas of medicine and experience the behind the scenes work in hospitals under my amazing mentor, Dr. Sabina Ali. I will forever be grateful towards the SSRP and Dr. Sabina for giving me this incredible opportunity to learn and grow my understanding in medicine.

INTRODUCTION

In the United States, over 80,000 children and young adults suffer from Inflammatory Bowel Disease (IBD). Elsewhere, globally, 0.4 for every 100000 children are diagnosed with Chronic Recurrent Multifocal Osteomyelitis (CRMO) per year. Inflammatory bowel disease (IBD) is a recurring and long-term (chronic) condition that affects the digestive tract with (Rosen MJ 2015). Chronic Recurrent Multifocal Osteomyelitis (CRMO) is a condition characterized by sterile bone inflammation with (Ferguson PJ 2012). Although the etiology remains unclear, this condition has been associated with inflammatory bowel disease (IBD).

OBJECTIVE

Focusing on children with IBD and CRMO, this project serves to describe the association in pediatric patients followed at UCSF Children's Hospitals. It aims to show the possible measures that can be taken in order to diagnose this illness and the steps that were taken before and ones that can be taken after the discovery.

METHODS

Through a retrospective analysis of children diagnosed with CRMO and IBD at the University of California Hospitals between 2008-2022, the medical records and health reports on these children will be used as the main source to examine the association, symptoms, tests, and treatments of these diseases.

ANTICIPATED RESULTS

Chronic recurrent multifocal osteomyelitis (CRMO) has been reported in association with inflammatory bowel disease (IBD) which is mostly apparent in children. This study is to provide further evidence for the true association of CRMO and IBD. We hope to find similar associations in the IBD and CRMO population followed at UCSF Children's Hospitals.

SIGNIFICANCE

Chronic recurrent multifocal osteomyelitis (CRMO) is a rare disease of children and adolescents. Associations of CRMO with other diseases have been reported which includes IBD. This case series adds to the literature of previously reported cases, confirming the true association between CRMO and IBD. CRMO may be considered a rare extraintestinal complication of IBD. While less than ten percent of CRMO carriers have a possibility of also having IBD, it shouldn't be overlooked as there is still a risk despite the small chance.

Aaron Featherstone

Evaluating the Effects of Mitochondrial Retention on Oxygen Consumption and Sickling in Sickle Cell Disease

Mentor: Angela Rivers, MD PhD; Contributing Authors: Sandra Larkin MS, Eric Soupene PhD, Hart Horneman, Nebeyat Zekaryas, Mikail Alejandro BS, Angela Rivers MD, PhD

I am a rising junior at Texas Christian University majoring in Biology. The love of science came to me early on. In the seventh grade and attending this program, I feel, will continually pique my interest in different topics throughout that summer that will drive my passion for science. I am a part of Dr. Rivers' laboratory in looking at sickle cell anemia and evaluating the effects of mitochondrial retention on oxygen consumption and sickling in sickle cell disease. Previously, all my dealings with the medical field, as far as shadowings and internships, have been clinical, so being a part of Dr. Rivers' laboratory has allowed me to not only gain experience and knowledge within the field of scientific research but also has allowed me to connect non-clinical scientific research to what I've seen, experienced, and learned within the clinic. I want to give a huge shout out to Dr. Rivers', Hart Horneman, Mikail Alejandro, Nebeyat Zekaryas, Yaw Ansong Jr, and the rest of the SSRP staff for all their help, love, and support thus far, and throughout the program.

INTRODUCTION

Sickle cell anemia/sickle cell disease (SCA/SCD) is a hereditary blood disorder that deals with the mutation of the hemoglobin protein. Hemoglobin is a protein within red blood cells responsible for carrying oxygen to tissues throughout the body. The β-globin gene is responsible for the mutation of hemoglobin, which then creates the Hemoglobin S protein. Hemoglobin floats freely within red blood cells; however, the mutation in hemoglobin S causes it to polymerize when deoxygenated, and causes red blood cells to sickle, and premature deaths of red blood cells. Those that inherit SCD endure painful episodes, organ/tissue damage, shorter lifespan, and a lower quality of life.

OBJECTIVE

The goal of this experiment is to determine the % of RBC with mitochondria that sickle.

METHODS

The ImageStream Mk II Imaging Flow Cytometer will be utilized to identify the potential relationship between sickling and mitochondrial retention within RBC fractions. MitoTracker Green will be used to stain for the presence of mitochondria and CD-71 transferrin receptor antibody will be used to identify the maturity of the red cells. Red blood cells from SCD mouse model and human samples will be deoxygenated with nitrogen gas.

Mouse model: Both female and male mice will be used, as biological sex differences have not been reported in SCD pathology. We will use the SCD (HbSS) mice for the proposed experiments. These transgenic mice contain the human α and human γ, and βA globin genes knocked into the appropriate mouse globin locus, and therefore express human sickle hemoglobin. They produce Hb S exhibit pathology similar to sickle cell patients.

Human Samples: The UCSF/Oakland Comprehensive Sickle Cell Center has 200 SCD patients. Samples of blood for analysis will be obtained when patients come for their routine clinic visit. Patients who have received a blood transfusion in the last 3 months or are transfused will be excluded. Recruitment strategies for patients with SCD include sickle cell program physician and nurse referrals during clinic visits. Referred patients were introduced in person to the research team member by a clinic staff member in the clinic or by phone or e-mail. Attempts were made to collect both male and female samples and a $10 incentive was offered to patients with each blood collection. HPLC was performed to confirm analysis.

ANTICIPATED RESULTS

We anticipate RBCs with mitochondria will have increased rates of sickling than those without mitochondria.

SIGNIFICANCE

The results of this study could show that mitochondria retention increases sickling within RBCs. Therefore, finding a way to inhibit mitochondrial retention could be a new therapeutic strategy for SCD.

Israel Fuentes-Juarez

Does Participation in NICH (Novel Interventions in Children's Healthcare) Improve Healthcare Utilization and Access?

Mentors: Alison Reed MD and Jenise Wong MD PhD

My name is Israel Fuentes-Juárez, and I am a rising junior at Gettysburg College. I am majoring in Biochemistry and Molecular Biology. My curiosity and interest in science were shaped by my participation in science fairs. I am a curious individual, and science has provided an outlet for me to explore. I am still exploring different career options within the scientific field, but I have recently expressed great interest in biomedical laboratory research. I want to be involved in such a field to help create more accessible and equitable medical technologies to help underrepresented communities. I am thankful to be a part of the CHORI SSRP for the experiences and lectures that continue to shape my understanding of the world. I am grateful to my mentors, Dr. Alison Reed and Dr. Jenise Wong, who have helped me gain a better understanding of my future in science through their consistent support and enthusiasm.

INTRODUCTION

Healthcare utilization and access to healthcare services is a priority for patients with chronic medical conditions such as diabetes mellitus and sickle cell disease as these chronic conditions require close monitoring to prevent acute health crisis (such as diabetic ketoacidosis or pain episodes) and to help improve health outcomes and quality of care. Healthcare utilization and access can be hindered due to negative social drivers of health, such as lack of consistent transportation or a low socioeconomic status. Social programs, such as Novel Interventions in Children's Healthcare, or NICH, assist families of children with chronic medical conditions who are also facing social risks. NICH aims to improve access and utilize healthcare by working with families to address the negative social drivers of health, to promote better health outcomes and to avoid unnecessary hospital visits and their associated costs.

OBJECTIVE

In this retrospective cohort study, the responses of individuals in the NICH program at UCSF Benioff Children's Hospital will be studied to see how patient's healthcare utilization and access changed from baseline when compared to 6-months or 12-months of NICH program participation.

METHODS

Participants in the NICH program completed the MVP PACES survey, which assesses social vulnerability (such as attendance at health care visits, patients emotional and social wellbeing, and social risks) at enrollment and at 6 and 12 months after enrollment. In this study the responses from participants that completed the baseline survey and at least one follow-up survey (either at 6 or 12 months) will be used for data analysis using descriptive statistics, such as t-tests and chi-squared tests.

ANTICIPATED RESULTS

While data is currently being analyzed, it's thought that there will be a correlation between patient participation in NICH with that of improved healthcare utilization and access. Knowing the NICH provides patients with more care coordination and reinforces medical treatments to manage chronic medical conditions, it's hypothesized that the number of sick and emergency visits would decrease while regular visits would increase.

SIGNIFICANCE

It's important to continue research in improving healthcare utilization and access among vulnerable populations which are more negatively affected by social drivers of health to create an equitable healthcare system.

Eashani Ghosh

Correlations Between Screening Methods for Diabetes Mellitus in Patients with Transfusion-Dependent Thalassemia

Mentor: Ayca Erkin-Cakmak, MD MPH
Contributing Authors: Tariq Ahmad, MD; Anne Rishon, MD; Ashutosh Lal, MD

Hi! I am Eashani Ghosh, a rising junior at McClintock High School. In my life, I have experienced firsthand the impact of individuals and breakthroughs in the medical field. Interacting with compassionate hospital staff and experiencing the transformative advancements in chelation and treatment methods as a thalassemia patient instilled in me an unwavering desire to help those around me in any way possible. Although medical research was not always my plan, my determination to conduct research emerged during eighth grade when, with the support of CHORI and HEDCO, I conducted a mini project relating to thalassemia. The SSRP further solidified my passion by providing an opportunity to delve into comprehensive research. I am forever grateful to my mentor, Dr. Ayca Erkin-Cakmak, who not only taught me about glucose tolerance screening for thalassemia patients but also guided me through the intricate research process and shared invaluable knowledge of data analysis.

INTRODUCTION

Diabetes Mellitus (DM) is a multifarious chronic condition characterized by the inability to regulate blood glucose. Hemoglobin A1c (HbA1c), used for the screening and diagnosis of glucose metabolism abnormalities, is a measure of percentage of glycosylated hemoglobin which reflects the average serum glucose for the past 3 months. While HbA1c is widely used for screening, it is an insufficient test for those with hemoglobinopathies, such as thalassemia, an autosomal recessive blood disorder. The nature of thalassemia, its effect on red blood cells and hemoglobin significantly impacts the HbA1c level, making it important to utilize other tests, such as fructosamine and oral glucose tolerance test (OGTT) to screen for glucose metabolism abnormalities. Fructosamine measures the glycation of various proteins in the serum. OGTT measures the amount of glucose in the serum before and after the consumption of 75g of glucose to determine the ability to regulate blood glucose.

OBJECTIVE

This study aims to ascertain and discuss any potential correlations between the OGTT and fructosamine in relation to the assessment of glucose metabolism abnormalities in patients with transfusion-dependent thalassemia.

METHODS

This is a secondary retrospective data analysis of a subset of data collected from the clinical data registry associated with Northern California Comprehensive Thalassemia Center at UCSF BCH-Oakland. Descriptive statistics are used to describe patient population and their characteristics. Regression models are used to model the effects of age, gender, type of thalassemia syndrome, chelator type, serum ferritin levels, and liver iron concentration on the following outcomes in patients over 10 years of age: Fructosamine (continuous, categorical: normal, elevated), OGTT interpretation (normal vs abnormal). Data analyses and graphical representation of the data will be performed with Stata, v17.1 (College Station, TX). The significance level of $\alpha = 0.05$ is used for all statistical analysis

RESULTS

We expect to find a positive correlation between fructosamine levels and the OGTT's indication of a presence of glucose metabolism abnormality. Additionally, the data will reflect that a higher ferritin, a longer duration of thalassemia, and an older age will each increase the likelihood of glucose metabolism abnormalities.

SIGNIFICANCE

Understanding any relationship (or lack thereof) between the two tests is crucial to setting a precedent for the diagnostic tests and diagnostic procedures when screening for glucose metabolism abnormalities in patients with transfusion-dependent thalassemia in an efficient and reliable manner.

Samina Ginwalla

Establishing a FACS-Based Method to Detect Cell Type Specific Markers During Differentiation of Induced Pluripotent Stem Cells into iPSC-Derived Hepatocyte-Like Cells

Mentors: Yuanyuan Qin, PhD and Marisa Medina, PhD

Hi everyone! My name is Samina Ginwalla and I am a rising senior at Carlmont High School. The only TV shows I watched growing up (until age 13) were National Geographic–and my personal favorite–Planet Earth. Although my passion for life comes from my inherent curiosity, I like to attribute my early passion for biology to David Attenborough and the venturesome camera team. Now, my interests have migrated from the ecosystem of a savannah to within the human body. I am fascinated by the processes happening within us, always searching for the answer to the question "Why?" While I am unsure as to what direction within human biology I want to pursue, I know that science and medicine will always have more for me to discover. I am immensely greatful for the opportunity to work in the Medina Lab (through SSRP) alongside Dr. Marisa Medina and Dr. Yuanyuan Qin; their expertise and patience have made my experience unforgettable.

INTRODUCTION

Induced pluripotent stem cells (iPSCs) are derived from adult somatic cells which have been genetically reprogrammed into an embryonic stem cell-adjacent state. These cell lines are a critical tool in biomedical research into disease mechanisms and modeling individual-level disease risk. For instance, in liver diseases associated with hepatocyte (liver cell) dysfunction, such as non-alcoholic fatty liver disease, iPSC-derived hepatocyte-like cells (iPSC-Heps) are a useful research tool . To create iPSC-Heps, an iPSC is first differentiated into endoderm, further specified into a hepatic progenitor cell, and finally, a hepatocyte-like cell. However, since all cells may not differentiate with the same efficiency, it is important to monitor the differentiation process.

OBJECTIVE

To monitor the progression of iPSC differentiation into an iPSC-Hep using cell type-specific markers by establishing a FACS-based method to detect cell type-specific markers.

METHODS

iPSCs will be cultured in mTESR1 media at 37° at 5% CO2 and 4% O2 and differentiated into iPSC-Heps using a combination of small molecules and inhibitors. Markers of pluripotency (TRA-1-60 and Oct 3/4), endoderm (SOX17 and FOXA2), hepatic progenitor (HNF4α and AFP), and mature hepatocytes (Albumin and ASGR1) will be measured by flow spectrometry during differentiation. iPSCs will be plated in multiple wells and stained with various fluorescent dye colors at critical stages during the differentiation process; undifferentiated iPSCs will act as the negative control and show pluripotency markers, and the human hepatoma cell line, Huh7, will be the positive control of mature hepatocyte markers. Bright-field microscopy will be utilized throughout the differentiation process to monitor changes in cell morphology.

ANTICIPATED RESULTS

The presence of mature hepatocyte markers in iPSC-Heps will confirm that the iPSCs have differentiated successfully. We expect to see only the appropriate markers for each stage of differentiation.

SIGNIFICANCE

iPSC-derived hepatocyte-like cells can be used to model individual level disease risk or to develop novel therapies. To accomplish this, robust assays to monitor the differentiation process are critical to ensuring the validity of these cells. Discovering a way to create cells that function like hepatocytes is key to helping mitigate the effects of malfunctioning liver in humans.

Gabino Guzman

Optimization of a Panoramic Three-Dimensional Optical Mapping and Ultrasound Imaging System For Ex Vivo Imaging of Isolated Contracting Hearts

Mentors: Jan Christoph, PhD and Jan Lebert, PhD

Hi! I'm studying at Hartnell Community College as a Biology, Chemistry, Physics, and Mathematics major on a Pre-Med track. I'm transferring next year! Where? I have no idea. Anyways, I didn't always want to pursue a career in STEM as I didn't believe it was achievable for someone from my background. I come from a Mexican immigrant family where no one had gone to college, much less finished high school. This changed when I became an intern for the UC Santa Cruz iGEM research team and won a gold medal at the world's largest bioengineering competition for producing a type 2 diabetes treatment from genetically engineered yeast. Now, I want to pursue an MD/MPH, ultimately working to research and reduce medical disparities in underserved communities. This summer, I worked with the Cardiac Vision Laboratory at the UCSF Cardiac Care and Prevention Center. I am eternally grateful for this opportunity made possible by CHORI and would like to thank the incredible SSRP staff, my amazing mentors Dr. Jan Christoph and Dr. Jan Lebert, and the esteemed Hartnell MESA Program for their continued support and guidance throughout my scientific journey.

INTRODUCTION

Heart disease is the leading cause of death worldwide, making up 16% of all deaths. One kind of heart disease results from malfunctioning of the heart's electrical system, which causes irregular contractions termed cardiac arrhythmias. Arrhythmias have severe consequences such as cardiac arrest, which 300,000 people die from each year in the United States. Arrhythmias are studied using optical mapping, but there's a growing need to refine the existing imaging techniques to map the heart.

OBJECTIVE

The primary aim of this investigation is to create a calibration device that allows for the cross-registration and alignment of optical and ultrasound data in the same coordinate system which will ultimately enhance the ex vivo imaging of hearts.

METHODS

Our calibration device is designed using a computer-aided modeling program "OnShape" and is 3D printed, comprising a flat surface with four or nine cones. The first experiment will begin by filling a chamber with 5 L Tyrode solution and using 40 µL Di-4-ANEPPS dye to stain the heart's surface. An electrode will be placed on the heart to initiate the action potential waves propagating across the heart surface. The ultrasound and cameras will collect the raw movement of the contracting heart. Our second experiment will be identical, except it will be calibrated using our target. Computer-based programming will assign pixels for both the ultrasound and cameras to track the tip of the cones. We will use Python, OpenCV, NumPy, Napari, and MatPlotLib to compare the imaging of the heart's surface to identify if calibrating both the ultrasound and photo-cameras will advance the three-dimensional reconstruction of the heart's movement during contraction.

ANTICIPATED RESULTS

It's hypothesized that by combining the raw data from the ultrasound and cameras, it will be possible to image epicardial action potential wave patterns with corresponding transmural wall motion.

SIGNIFICANCE

The heart's properties can be expressed through models which possess new insights leading to novel therapeutic approaches to cardiac arrhythmias. By improving the methodology employed to model the heart's behavior in cardiac arrhythmias, our understanding of cardiac arrhythmias can grow and guide physicians in their search for effective treatment, maintenance, and non-evasive diagnosis of cardiac arrhythmias.

Antonio Harris

Examining Beta Thalassemia Major and the Association Between Hypoparathyroidism and Bone Disorders

Mentors: Tariq Ahmad, MD FAAP and Ayca Erkin-Cakmak, MD MPH

Hi! My name is Antonio Harris and I am a rising sophomore at Contra Costa College. I am currently majoring in Biology, but as I progress in my academic journey, my choice of major has been changing alongside my growing interests. My love for the sciences had not always existed, until I realized it encapsulates everything. From chemical processes involved in cooking and baking to genetic factors preventing me from becoming the next LeBron James, I want to learn how science applies to everything. I decided to apply to CHORI SSRP because I knew it would introduce me to more ways science can be applied to life and enhance my understanding of it, which it has thus far! From working with the spectacular Dr. Ahmad, I have learned much about the thalassemias and the various endocrinopathies associated with it. Our research aims to find treatments to ameliorate the conditions and comorbidities accompanying transfusion-dependent beta thalassemia. Our eventual goal will be to provide assistance to the nearly 90 million global cases of transfusion-dependent beta thalassemia and help those with insufficient access to better conditions. Thank you so much to Dr. Ellen, Dr. David, and Dr. Ahmad for such a wonderful experience!

INTRODUCTION

Beta-thalassemia major (TM) is an autosomal recessive anemia that disrupts effective red blood cell production. It inhibits the synthesis of beta-globin chains and requires regular transfusions through one's lifetime. Regular transfusions can lead to iron overload, affecting endocrine glands, causing growth impairments and bone malformation. As a result, patients with TM often develop endocrinopathies such as hypoparathyroidism, hypogonadism, and diabetes, alongside bone disorders, namely osteopenia.

OBJECTIVE

We speculate that in patients with TM, bone density will be negatively associated with vitamin D and PTH levels. As a secondary objective, we will describe the prevalence of hypovitaminosis D and hypoparathyroidism in this cohort.

METHODS

The study was retrospective, using a dataset of TM patients at Children's Hospital Oakland in the division of hematology. The study included individuals who are transfusion dependent and have available data for DEXA Z-score, 25(OH) vitamin D, parathyroid hormone (PTH), calcium, and phosphorus. Statistical analyses included scattergrams, primarily focusing on DEXA Z-score and its relation to PTH. A secondary analysis correlated vitamin D, PTH, calcium, and phosphorus data with DEXA Z-scores to look for associations. Low bone density was indicated by Z-scores <1.5 SD while low vitamin D was <30 NG/ML. Low corrected calcium with normal or low PTH was also noted.

ANTICIPATED RESULTS

Based on preliminary data, we anticipate patients with TM to exhibit low DEXA hip and spine Z-scores and a higher prevalence of endocrinopathies compared to those with normal Z-scores.

SIGNIFICANCE

Beta-Thalassemia Major affects 1 in 100,000 people globally, hindering normal life. Bone complications such as mineral density and pain are ubiquitous in patients with TM. Detecting associations between DEXA scans and a lack of bone-building nutrients can lead to proper nutrient supplementation, potentially mitigating such bone disorders.

Samirah Isah

Modeling Non-Alcoholic Fatty Liver Disease using Patient-Derived Induced Pluripotent Stem Cells

Mentors: Marisa Medina, PhD and Yuanyuan Qin, PhD

Hello, my name is Samirah and I am a rising senior in the small school Academic Choice at Berkeley High School. My hobbies are exercising, reading, art, and writing. I am a part of the Biotechnology Academy, STEMinist Club, Medical Club, and National Society of Black Engineers. I joined this program to be able to expand my knowledge on further career opportunities and to meet new people. I have always been interested in research and working in a lab and since I had some experience with a biotech program during my junior year it encouraged me even more to apply. This opportunity seemed perfect for a summer internship. I am hoping to attend a four-year university and major in the biological sciences and concentrate on genetics. CHORI has provided me with the knowledge to help me pursue my interests in the future. Everyone in the Medina Lab has helped me with the idea of how to work in a team while working in a lab. Thank you to Dr.Medina and Dr.Yuanyuan for helping me and being patient with me over this amazing summer.

INTRODUCTION

Nearly ¼ of Americans have non-alcoholic fatty liver disease (NAFLD) a spectrum of liver disorders that starts with excess fat within the liver (simple steatosis), that can progress to more serious forms of liver disease (steatohepatitis, cirrhosis, hepatocellular carcinoma or liver failure). Currently NAFLD is the leading cause of liver transplant in women, and the second leading cause in men. Since NAFLD is initiated by the accumulation of excess fat within a cell, this process can be readily modeled using a cellular system. Induced pluripotent stem cells (iPSCs) are a type of cell that can be made from anyone and can be differentiated into any cell type. Importantly, the Medina lab has shown that iPSCs accumulate excess fat (triglycerides) in response to incubation with oleate, a long-chain fatty acid, suggesting that these cells can be used to understand differences in individual level NAFLD risk.

OBJECTIVE

To compare oleate-induced intracellular lipid levels in iPSCs from patients with NAFLD (n=3) to iPSCs from healthy controls (n=3).

METHODS

40,000 iPSCs will be plated within each well of a 6-well dish, and cultured in mTESR1 media at 37ºC, 5%CO2, 4%O2. Once the cells reach 80% confluency, they will be treated with 100uM oleate or BSA control in HCM media. After 24 hours, cells will be fixed with 10% paraformaldehyde and stained 100 mg/mL Nile Red, a fluorescent dye that stains neutral lipids. After 30 minutes, Nile Red fluorescence will be quantified by flow cytometry in at least 10,000 gated events. Each iPSC cell line will be quantified in triplicate, and the fold change of oleate vs BSA will be calculated for each cell line and compared between cases and control iPSCs with the Student's test in GraphPad Prism.

ANTICIPATED RESULTS

iPSC from patients with NAFLD will have higher levels of intracellular lipid accumulation than iPSCs from healthy controls.

SIGNIFICANCE

Demonstrating that iPSCs from NAFLD cases have higher lipid accumulation compared to iPSCs from healthy controls supports the idea that these cell lines can be used to inform individual-level risk of NAFLD and/or examine new mechanisms of disease.

Aminah Jamal

A Cross-Sectional Analysis on Frailty and Nutritional Status, a Mediating Factor Between Food Insecurity and Frailty, of Men and Women With and Without HIV

Mentor: Jennifer Price, MD PhD

Hello! My name is Aminah Jamal, and I am a rising junior at UC Berkeley majoring in molecular cell biology and minoring in global poverty and practice. From a young age, I found joy in and passion for serving others whether that was volunteering at a soup kitchen, participating in community food drives, or advocating for my underrepresented Muslim and Afghan community. My passion for science first sparked after I took Honors Advanced Anatomy in my senior year of high school, and ever since I became interested in the intersection of service, science, and medicine. I am entirely grateful for my supportive mentor, Dr. Jennifer Price, who gave me an incredible experience in my science journey at the UCSF CHORI SSRP of engaging in innovative research and networking with amazing people. I hope to use my passion and presence in scientific circles to help reduce healthcare disparities among underserved communities.

INTRODUCTION

As of 2023, around 38 million people are living with HIV (human immunodeficiency virus) worldwide, and over 15,000 people are affected by HIV alone in San Francisco. Frailty is a common symptom among persons living with HIV, and food insecurity due to many socioeconomic and racial inequities play a role in one's ability to acquire a nutritious diet. I will study a niche of food insecurity, nutrition, to analyze the correlation between certain nutrition and frailty in those with and without HIV. Although recent studies have found that food insecurity is strongly correlated with frailty, the mediating factors are quite uncertain.

OBJECTIVE

To determine whether obtaining healthy nutrition, including dairy and dark greens, impact one's frailty and HIV status. Other confounding variables such as gender, age, race, and alcohol use will be considered.

METHODS

Participants enrolled at the San Francisco site of the MACS/WIHS Combined Cohort Study (MCWWS), which is the combination of two previous studies: the Multicenter AIDS Cohort Study (MACS) and the Women's Interagency HIV Study (WIHS), will be included. Frailty phenotype will be measured using MCWWS-derived cutpoints, in which 3 of 5 of the following criteria must be met: weight loss, exhaust, limpy, slow, and weak. We will evaluate the potential associations of components of nutritional intake with frailty in participants with and without HIV. High nutrition will be defined as consuming a healthy amount of dairy and dark greens, Additional covariates will include age, race, gender, and alcohol use.

ANTICIPATED RESULTS

High nutrition will be strongly correlated with low frailty. Women and those living with HIV will be more frail than men.

SIGNIFICANCE

Understanding how nutrition impacts frailty and HIV status can initiate practices to increase awareness efforts and accessibility to certain nutrition and/or healthy eating habits.

Kayla Jones

Understanding Experiences of Patients with Sickle Cell Disease in Order to Advance Anti-Racism in Clinical Practice

Mentors: Henry Ocampo, MPH and Marsha Treadwell, PhD

My name is Kayla Jones. I am a Junior entering my first year at Emory Nell Hodgson Woodruff School of Nursing. I am an Alumni to the SSRP UCSF Summer research Internship. During my participation in the program, both in 2019 and 2023, I specifically worked with a patient population oftentimes underserved and received fewer resources from the scientific, clinical, and public health communities: Patients with Sickle Cell Disease. My passion for working with Patients with Sickle Cell started when I noticed the effects of the intersectionalities between race, gender, and social class and how they affect the care one receives. Being a woman of color and seeing the effects of economic status and race affect the care my family members received has created a drive within me to bring awareness and continue to be in the forefront of the fight to create a medical system that is intentional in the same level of care to all despite race, gender, social class, etc. The CHORI SSRP program has given me the opportunity to delve deeper into my passion for clinical research. I am thankful for my two wonderful mentors: Dr. Marsha Treadwell and Mr. Henry Ocampo.

INTRODUCTION

A 2020 report from the National Academy of Science, Engineering and Medicine highlighted the negative impact of stigma and racism on access to and quality of healthcare for the sickle cell disease (SCD) population, contributing to poor health outcomes and diminished health related quality of life (McCormick, 2020). We hypothesized that patients with SCD and their families face significant disparities in their experiences of care within Benioff Children's Hospital Oakland (BCH Oak) when viewed in relation to overall patient experience but that implementing structural changes and educating providers within an anti-racism framework will decrease those disparities.

METHODS

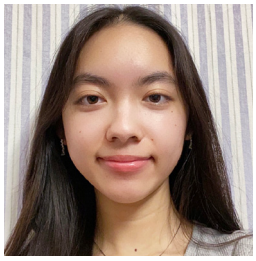
NRC Health Patient Experience surveys were completed in FY21 and FY22. and ICD codes were used to extract responses for patients with SCD. Scores for "likelihood to recommend" ranged from 0 (worst possible) to 100 (best possible). For the three other questions, we looked at the percent of patients with the highest ratings (Top Box). Beginning in FY21, we began to systematically address health inequities across BCH Oak structurally (e.g., EHR embedded pain plans) and as interpersonally mediated (e.g., by supporting courageous conversations about race, ethnicity and language, and educating about disparities and implicit bias.)

RESULTS

We examined score differences between patients with SCD compared with the average for all patients/families completing the surveys at BCH Oak in FY21 (n = 129 and 26,188) and FY22 (n = 175 and 31,585). As expected, patients with SCD trended lower than the BCH Oak average on "likelihood to recommend" (69.8 vs 73.1) and "trust in providers" (69.2% vs 73.6%) in FY21. While higher percentages of patients with SCD reported confidence in nurses (73.1% vs 69.8%) and satisfactory pain management (72.3% vs 69.4%) compared with the BCH Oak average in FY21, scores for patients with SCD further improved in FY22 (by as much as 6 percentage points) and trended above the BCH Oak average.

SIGNIFICANCE

Our hypotheses were partially supported, with some disparities seen in experiences for patients with SCD in FY21 at BCH Oak but with improvements in all areas assessed as we engage as a system in the elimination of racism and discrimination.



Linda Ly

The effects of dietary calcium intake, vitamin D status, body mass index, body composition, grip strength, and physical activity on bone mineral density by dual-energy X-ray absorptiometry in early puberty transgender and gender-diverse youth receiving one year of puberty blockers

Mentor: Janet Lee, MD MPH MAS

Hello! My name is Linda Ly, and I am a rising freshman in college majoring in nursing. Growing up, I was constantly sick, meaning many doctor visits, Western medicine, and Vietnamese/Chinese remedies. Using a variety of medicine made me question how different types of medicine could work to treat the human body, which sparked my interest in science. However, as a first-generation, low-income student, it was difficult for me to gain experience in working with science throughout my academic career. I was not able to pursue my passion until I joined CHORI SSRP. This program has given me the chance to shadow a doctor, gain clinical experience, and practice research skills, such as writing a proposal and giving oral presentations. I am incredibly grateful for this opportunity, and I would like to thank my mentor, Dr. Janet Lee, and the SSRP leadership for their guidance and support this summer.

INTRODUCTION

Many transgender and gender-diverse (TGD) youth experience worsening gender dysphoria with pubertal changes. They may receive gonadotropin-releasing hormone agonists (GnRHa) to suppress puberty and allow for further gender exploration without the undesired development of secondary sex characteristics. However, puberty suppression is associated with slowed bone mass accrual. Previous studies reported a high prevalence of low bone mineral density (BMD) in TGD youth prior to medical treatment. Bone health is impacted by factors such as dietary calcium intake, vitamin D status, body mass index (BMI), body composition, muscle strength, and physical activity.

OBJECTIVE

Our study aims (1) to analyze the effects of dietary calcium and vitamin D status on BMD accrual by dual-energy X-ray absorptiometry (DXA) in early pubertal TGD youth before and after one year of GnRHa, and (2) to analyze the effects of BMI, body composition, grip strength, and physical activity on BMD accrual by DXA in early pubertal TGD youth before and after one year of GnRHa.

METHODS

This observational prospective study examined the skeletal effects of puberty suppression in 34 TGD youth at Tanner Stage 2-3 initiating GnRHa recruited from one academic site over one year. Exclusion criteria included taking medication that negatively affects bone health or those with primary bone diseases. We collected dietary calcium intake through Calcium Counts!: Food Frequency Interview for Children, serum 25-hydroxyvitamin D, grip strength with hand dynamometer, physical activity through a modified Slemenda physical activity questionnaire, and BMD by DXA. We calculated height Z-score adjusted BMD Z-scores and BMI Z-scores based on chronologic age and sex designated at birth. We utilized descriptive statistics, Student's t-test, and linear regression models to analyze the data. We set a significance level of alpha = 0.05 for all statistical analyses.

ANTICIPATED RESULTS

Higher intake of dietary calcium, vitamin D status, BMI, lean mass, grip strength, and physical activity are associated with a higher increase in BMD in TGD youth receiving GnRHa.

SIGNIFICANCE

There is little research on what predictors contribute to BMD in TGD youth. Identifying important predictors could help clinicians optimize bone health in TGD youth receiving gender-affirming medical therapy.

Medha Madhav

Does Radiation Exposure During Puberty Accelerate Inflammaging?

Mentor: Mary Helen Barcellos-Hoff, PhD

I am Medha Madhav, a rising sophomore at UC Berkeley, with an intended major in Nutritional Sciences. I hope to pursue a career in medicine, while also being involved in research. These pursuits of career will help equip me with tools to fulfill my goals to bring more knowledge to and from the scientific community, and better community health. I am very fortunate to be accepted by the Summer Student Research Program(SSRP) at UCSF. It is very inspiring and insightful to hear from people who have been through various treks in their career pathways. Beginning my research journey at the Barcellos-Hoff Lab teaches me everyday to pay tremendous attention to detail, the importance of constant teamwork, and communication. I am grateful for everyone who I'm working with, and what they are teaching me along the way. SSRP has strengthened my resolve to touch the lives of others with science.

INTRODUCTION

Inflammaging is the occurrence of increased immunosuppressive immune cells in aging individuals. The immune system skews towards myeloid cells rather than lymphoid cells. The innate immune system is composed of anatomical and physical barriers, and cells such as monocytes, neutrophils, and macrophages. In contrast, the specialized, or adaptive immune system is affected, and is composed of T and B lymphocytes, antibodies in blood. T cells are crucial for tumor elimination, and therefore reduce the ability of aging individuals to fight cancer. Carcinogenesis is the process of normal cells transforming into cancer cells. Ionizing radiation can be a carcinogen, causing DNA damage and altering cell interactions. It also has been postulated to accelerate aging.

HYPOTHESIS

If ionizing radiation accelerates aging by causing inflammation, then irradiation during puberty will accelerate the skewing towards myeloid populations.

METHODS

5-week old mice were sham irradiated(control), irradiated with a dose of 0.5 Gy, treated with low dose aspirin, and double-treated (0.5 Gy and aspirin). They were transplanted 3 days later with Trp53 null epithelium. A subset was sacrificed at 4, 8 and 18 months for collection of blood. Blood cells were immunostained, a process that uses antibodies to identify protein markers, and samples were analyzed through Cytek flow cytometer. Next, the data were analyzed using a gating process on FCS Express that was used to distinguish cell populations based on immune cell lineage markers, then converted to graphs on Prism Graphpad.

RESULTS

Consistent with previous reports, CD4 T cells, NK cells, CD8 T in the blood decreased with age, whereas circulating MDSC, B cells, DNT and dendritic cells increased with age. Specimens from mice treated with radiation or aspirin or the combination did not differ.

SIGNIFICANCE

This experiment is meant to inform the potential health effects for people who are exposed to radiation during puberty. Understanding the effect on systemic immunity may help mitigate long-term cancer risk.

Irma Medoza Gomez

The Effect of Pathology-Related Phosphorylation on α-synuclein Transmission Between Cells

Mentor: Shenjie Wu, PhD

Hi, my name is Irma Mendoza Gomez and I am a rising freshman at Stanford University. I will be majoring in Biology and minoring in Environmental Justice and Human Rights. Early on in elementary school, I fell in love with any subject related to science–from botany to astrology. Eventually, through learning about environmental science and the health effects of climate change, I became enamored with healthcare. As I have participated in SSRP and learned more about the molecular biology behind neurodegenerative diseases, my passion for medicine and biology has grown. Thanks to my mentor, Dr. Shenjie Wu, I will be able to go into college confident enough to pursue biological research opportunities. I will use my cumulative experience to attend medical school. I will work as an Emergency Room physician while being conscious of the disparities in health caused by environmental injustice. Thanks to SSRP, my aspirations have become clearer.

INTRODUCTION

Parkinson's disease (PD), the second most common neurodegenerative disease in the United States, is associated with the presence and proliferation of phosphorylated α-synuclein aggregates in the substantia nigra. α-synuclein is normally present in the brain but the excess accumulation of α-synuclein aggregates is common in patients with PD. A majority of α-synuclein aggregates in PD patients are phosphorylated at Serine 129. Extracellular α-synuclein may spread between cells as PD progresses. Previous work examined the secretion of α-synuclein from various types of cells but the spread of the protein is not yet fully understood. Phosphorylated α-synuclein has been reported to enhance its toxicity. From prior research, it is believed that phosphorylation of α-synuclein may accelerate its aggregation and induce cell death. However, the exact role phosphorylation in PD pathogenesis remains elusive.

HYPOTHESIS

Cell surface proteins present in nerve cells are receptors that allow α-synuclein, especially phosphorylated α-synuclein, to enter the recipient cells.

METHODS

We conducted in vitro phosphorylation of α-synuclein followed by a Western Blot. We performed a Bicinchoninic acid (BCA) assay to quantify protein concentration. We differentiated SH-SY5Y cells with retinoic acid (RA) to a more neuron-like state. We will treat the cells with different forms of α-synuclein, i.e. non-phosphorylated α-synuclein monomer and fibril as well as the phosphorylated counterparts. α-synuclein will be labeled with fluorescent dye (TAMRA-SE). The plasma membrane of the cells will be labeled with CellMask staining. We will examine and quantify the uptake of phosphorylated and non-phosphorylated α-synuclein aggregates into the differentiated SH-SY5Y cells with fluorescence confocal microscope.

ANTICIPATED RESULTS

After conducting the experiments, we expect to find that phosphorylated α-synuclein is more efficiently up-taken by the cells than non-phosphorylated α-synuclein.

SIGNIFICANCE

This study paves the road for identification of receptors of phosphorylated α-synuclein aggregate in the future. If we were to identify and locate a neuronal receptor responsible for the uptake of phosphorylated α-synuclein, it could be a potential therapeutic target to slow or reverse Parkinson's Disease progression.

Kelly Ngo

Antibiotic Resistance in Eye Surgeries (ARIES)

Mentor: Thuy Doan, MD PhD

Hello! My name is Kelly Ngo (she/her/hers), and I am a rising sophomore at Johns Hopkins University majoring in Molecular and Cellular Biology. As a first-generation student, I was always lost in finding my passion, the "thing" that brings me joy. It was not until I realized that simply giving my seat up to others on the bus gave me the brightest smile for the day. This connects to my dream of working in the medical field and spending my time assisting multitudes of people. My first step starts with putting on a lab coat. Having had no experience researching in a wet lab before, I am deeply grateful for my incredible mentor Dr. Thuy Doan and the Doan Lab team for being inclusive and providing their invaluable time and guidance to advise me. Thank you to CHORI SSRP for the precious opportunity to work alongside these amazing scientists and researchers.

INTRODUCTION

The rise of antibiotic-resistant bacteria from excessive clinical usage of antibiotics has led to a critical need to understand and combat this phenomenon. Currently, infections of antibiotic resistant pathogens in the eye are poorly understood. We seek to investigate this critical issue by analyzing the microbiomes and resistomes of cataract surgery patient who use post-operative antibiotic prophylaxis.

HYPOTHESIS

We hypothesize a higher frequency of topical ocular antibiotic usage for eye surgeries results in development of ocular surface antibiotic resistance, in addition to the emergence of systemic antibiotic resistance.

METHODS

This was an investigator-masked placebo-controlled randomized trial. Participants were randomized in a 1:1:1 fashion to one of 3 interventions: 1) no topical moxifloxacin, 2) 1 drop of moxifloxacin 4 times a day for 1 week, or 3) 1 drop to topical moxifloxacin 1 time a day for 1 week. Swabs (nasopharyngeal, conjunctival, buccal, and rectal) were collected from 108 participants at three distinct time points: before surgery, one-week post-surgery, and four-weeks post-surgery. DNA was extracted using the QIAamp DNA Mini Kit (Qiagen) on the QIACube and DNA-seq libraries were prepared using the NEBNext Ultra II DNA Library Prep Kit (NEB) per manufacturers' recommendations. Custom antimicrobial resistance (AMR) gene probes (Roche) were used to enrich for AMR genes. Libraries were pooled and sequenced on the NovaSeq 6000 (Illumina) using 150-nucleotide paired-end sequencing.

ANTICIPATED RESULTS

We hypothesize that the use of topical ophthalmic antibiotics will lead to an increase in ocular surface (local) and nasopharyngeal (systemic) genetic resistance determinants. We do not anticipate an increase in antibiotic resistance in the gut. Similarly, we predict that the ocular microbiome will alter with topical antibiotic use, but the nasopharyngeal and gut microbiome will not change.

SIGNIFICANCE

It is unclear if topical antibiotic treatment at the individual level leads to a meaningful increase in resistance. This study aims to determine whether the use of antibiotic eye drops will directly cause a change in the resistomes of the treated individuals. The results have the potential to provide guidance for antibiotic usage in ophthalmology.

Ryan Nickens

HLAtools – The Open-Source Informatic Toolkit For Immunogenomic Research

Mentor: Steven Mack, PhD
Contributing Authors: Livia Tran and Derek Pappas, PhD

My name is Ryan Nickens, and I am a rising sophomore studying biology at Lafayette College. Ever since I was a child, I have had an endless stream of questions about how organisms work and function. Scientific research and experiments have always interested me, answering previously unanswered questions by running tests seemed so magical to me. I am currently exploring my interest in research at Lafayette College. I am unsure of what specific career I would like to pursue, but I am certain it will involve research. This summer at SSRP I am excited to take part in a research project, help people, and learn new skills. I am excited to help the lab build tools which will be used in experiments, analysis, and making information more accessible. I would like to thank Dr. Steven Mack, as well as the entire Mack Lab, for their support and guidance and the SSRP staff for this incredible opportunity.

INTRODUCTION

The Human Leukocyte Antigen (HLA) genes play an important role in both the adaptive and innate immune systems of humans. HLA genes are widely associated with a number of diseases, for example the HLA-DRB1:15:01 allele is known to be present in individuals who have multiple sclerosis. They also play an important role in determining transplant (bone marrow, kidney, etc) success. With nearly 37,000 alleles discovered so far, HLA genes are the most polymorphic genes in the human genome. Because of this polymorphic nature and the increasing number of alleles being discovered every year, analyzing them requires a different approach than analyzing other, less polymorphic genes. Publishing open source tools to help us better understand the role HLA plays in disease and immune response is important and necessary for future research involving HLA genes.

OBJECTIVE

The objective of this project is to publish an R package named “HLAtools”, R is a coding language used for data analytics. This package contains functions to search for and align alleles on positions for amino acids, codons, and nucleotides. It contains functions which update allele information, trim allele names, translate between two standard naming formats, create alignments and atlases of exons and introns for each locus, as well as build an object of all allele releases.

METHODS

I adapted existing code and wrote new functions to create an extensive toolkit for analyzing the HLA genes. “HLAtools” will consume nucleotide and peptide data from the IPD-IMGT/HLA (Immuno Polymorphism Database-international ImMunoGeneTics project) Directory, an online database for HLA information.

ANTICIPATED RESULTS

I will publish the “HLAtools” package to CRAN (Comprehensive R Archive Network), the central software repository for R.

SIGNIFICANCE

Open-source bioinformatic tools are integral in scientific and medical research, understanding HLA-associated diseases, and determining stem-cell and solid organ transplants. By publishing “HLAtools”, researchers will be able to utilize this wide variety of analytic and translational capabilities in their work.

Mercy Niyi-Awolesi

Association of COVID-19 Infection and Vaccination in the Development of Graves' Disease

Mentors: Jennifer Olson, MD and Hannah Chesser, MD

My name is Mercy Niyi-Awolesi, and I am a rising senior attending Jesse Bethel High school. Past experiences and journeys have allowed me to develop an immense passion for public health and health equity. Being an older sister, I have grown up taking care of kids, and this experience as well as my love for medicine, sparked my interest in becoming a pediatrician. I am so grateful for CHORI, which has given me the opportunity to explore research and learn a lot about the different fields of medicine as well as learn about health disparities and health equity. This summer, I am privileged to work with my amazing mentors, Dr. Jennifer Olson and Dr. Hannah Chesser, in research regarding correlations between COVID-19 and Graves Disease.

INTRODUCTION

Graves' disease is an immune system disorder that causes the thyroid gland to produce too much thyroid hormone. Physicians in the Pediatric Endocrinology Department noticed that the incidence of Graves' disease seemed to increase after the onset of the COVID-19 pandemic. However, the research done last year by Aiden Higuera-Toris, Jennifer Olson MD, and Hannah Chesser M.D. showed no significant increase in the incidence of Graves' disease in the 2.5years after the onset of the COVID-19 pandemic compared to the 2.5 years prior to the pandemic. However, it is not known whether or not those patients who developed Graves' disease had been infected with COVID-19 prior to being diagnosed with Graves' disease. It is also not known whether or not these patients had received the COVID-19 vaccine prior to their diagnosis of Graves' disease. The purpose of the current study is to determine the percentage of patients with Grave's disease who had previously been diagnosed with COVID-19 or who had received the COVID-19 vaccine.

HYPOTHESIS

The objective of this study is to obtain a better understanding of the effects of COVID-19 infection and COVID-19 vaccination on the incidence of Graves Disease. This research will take a closer look into the research done last year that studied the incidence of Graves' disease before and after the onset of the COVID-19 pandemic. In the current project, evidence of COVID-19 infection and/or vaccination will be studied in patients who developed Graves' disease to determine the prevalence of COVID-19 infection and/or vaccination in this population.

METHODS

This project is a retrospective chart review. The methods used include reviewing the charts of 99 patients previously identified as having Graves' disease or hyperthyroidism and looking for documentation in their charts of COVID-19 infection and vaccination and the dates.

RESULTS

Based on the data so far, it does not appear that most patients with Graves' disease had a prior infection with COVID-19 or had received a COVID-19 vaccine. Part of the limitation is that documentation of COVID-19 infection may not be present in the chart due to the widespread use of home tests.

SIGNIFICANCE

This study is a good step to further understanding if there is a link between COVID-19 and Graves' disease. If there is a link, this could lead to additional research to better understand what causes Graves' disease.

Lilly Nusratty

Mapping the Epitopes of a Meningococcal Antigen Recognized By Vaccine-Elicited Human Monoclonal Antibodies

Mentor: Peter Beernink, PhD

Hi, my name is Lilly Nusratty and I am a rising senior at UC Berkeley where I am majoring in Molecular and Cell Biology with an emphasis in immunology. Growing up as an Afghan American, I've witnessed the barriers my community has faced when attempting to access health and basic needs resources. My desire to better understand health disparities inspired my public health and immunology as well as my career goal of becoming a physician. By participating in CHORI, I was given the opportunity to further explore these interests by studying Neisseria meningitis' pathogenesis and vaccine design. I'm so thankful to have had the opportunity to work under my mentor, Dr. Peter Beernink, who provided me with invaluable guidance while navigating research. Ultimately, I believe that these experiences will provide me with a strong foundation to continue my learning and passion for medicine and research.

INTRODUCTION

Neisseria meningitidis is the leading cause of bacterial meningitis and sepsis worldwide and has the highest incidence in infants and adolescents. There are currently two vaccines which elicit a protective antibody response against meningococcal serogroup B strains; both contain Factor H binding protein (FHbp) as a key antigen. FHbp is a surface protein that acts as a virulence factor by binding to Factor H (FH), a complement regulator. This binding suppresses the activation of the alternative complement pathway on the bacterial surface, which enhances bacterial survival in serum and blood. FHbp sequence variants are assigned identification numbers (ID) and are classified into two subfamilies, A and B, or three variant groups. Following vaccination with fHbp, antibodies can bind to fHbp to prevent binding to Factor H to prevent the downregulation of complement activation. However, there is little or no inhibition of fH binding by human anti-fHbp antibodies and, therefore, limited protection against strains with mismatched fHbp variants. Consequently, a greater understanding of the protective antibody responses against fHbp is needed.

OBJECTIVE

This project's objective is to better understand the binding and functional mechanisms of anti-FHbp antibodies by identifying important amino acid residues that contribute to the antibody binding sites on FHbp ID 1 ("epitopes").

METHODS

I will perform site-specific mutagenesis to replace FHbp amino acid residues with different amino acids (knock out mutants). Then, we plan to purify the mutant proteins using nickel affinity chromatography, whereby the mutant FHbps are isolated via adsorption of histidine tags to columns containing nickel ions. Then, we will test for decreased binding of antibody Fab (fragment antigen binding) fragments with immunoblotting (Western Blotting) and enzyme-linked immunosorbent assay (ELISA), to determine if the mutated amino acids play a role in Fab-fHbp binding.

RESULTS

We expect decreased/inhibited antibody binding upon the mutation of the amino acid residues in the fHbp.

SIGNIFICANCE

By better understanding which amino acids in the fHbp epitope play a significant role in antibody binding, we will gain insight into the antibody binding mechanism. Increased knowledge about anti-fHbp antibodies will facilitate vaccine development for *Neisseria meningitidis* serogroup B.

Ali Odeh

Effects of Hyperuricemia on Kidney Function in Patients with Sickle Cell Disease at UCSF Benioff Children's Hospital Oakland

Mentor: Robert Hagar, MD

Hello! My name is Ali Odeh, and I am a rising senior at Stanford University majoring in Human Biology. I am a returning alumnus from the 2022 SSRP cohort, and I am especially excited to reengage with the program in a mentorship and leadership capacity. Last year, I had the privilege of working with Dr. Ward Hagar, a physician-scientist, in the hematology division at UCSF Benioff Children's Hospital in Oakland. Last summer I witnessed the ways in which compassionate patient-centered care coupled with physicians at the forefront of their research fields produce the most effective medical care. This experience invigorated my passion for clinical research, and the real-world consequences it has on patient treatment. This summer, I will continue my research with Dr. Hagar. After graduation, I wish to pursue a career in medicine, and I am certain the lessons I learned through SSRP will prove invaluable.

INTRODUCTION

Sickle Cell Disease (SCD) is a recessive heritable blood disease that affects roughly 100,000 people in the US. This disease causes polymerization of deoxygenated hemoglobin resulting in abnormally rigid red blood cells. Affected individuals experience vaso-occlusion-induced tissue hypoxia leading to pain crisis. While recent advancements in medical care have extended the lifespan of SCD patients, chronic kidney disease (CKD) is a leading cause of death and co-morbidity for adult sickle cell patients.

OBJECTIVE

The primary aim examines the effects of elevated serum uric acid (hyperuricemia) on CKD in patients with SCD. Renal function will be measured by changes in longitudinal glomerular filtration rate (eGFR). It is hypothesized that SCD patients with higher uricemia will develop worse CKD. Last summer, we demonstrated a decline in eGFR of about 7 units for every one unit rise in uric acid by linear regression. The key objective for this summer is to examine if this increase in uric acid precedes the decline in renal function and establish a more casual relationship.

METHODS

An Access query will be used to retrieve clinically collected data from the departmental SQL server containing all the APeX data up to June 1, 2023, from UCSF Benioff's Children's Hospital Oakland. All metabolic and hematologic values for patients attending the Sickle Cell Center in Oakland will be extracted into an Excel or CSV database. The medical record numbers will be replaced with unique identifiers and discarded. We will be using functional linear regression to allow evaluation of lead times of changes in uric acid to changes in renal function. Longitudinal and time series analysis may be used to determine the effects of metabolic and hematologic co-variates on the effect of changing uric acid levels to eGFR.

RESULTS

Prior research has demonstrated that uric acid is a marker for hemolysis and endothelial dysfunction. We predict that elevations in uric acid will precede CKD or predict a more rapid eGFR decline.

SIGNIFICANCE

The findings of this investigation can have an immediate impact on the health of patients with SCD. If hyperuricemia accelerates CKD, then safe and widely used drugs are capable of reducing serum uric acid levels.

Precious Offu

Examining the Resource Utilization of Families Who Were Referred to the Family Information and Navigation Desk

Mentors: Dayna Long, MD, Robert Mok
Contributing Authors: Lisette Mazon; Alejandra Plata Zuniga

My name is Precious Offu. I am a rising senior at Holy Names High School in Oakland. Ever since I could walk, medicine has always been a passion of mine. From the age of 3 to the age of 5, I would walk around the house with a stethoscope in an attempt to check my family's "temperature". My strong interest in medicine and my desire to one day become a doctor led to my general curiosity about science. As I got older, I became more knowledgeable about the many medical specialties and science-related professions. I changed my mind about what kind of doctor I wanted to be over those years, and nursing even emerged as a possibility. Although I wasn't sure what I wanted to be, I knew it would be in the field of medicine, especially as a First-generation Nigerian American to break down barriers and be a part of those who have created the trend of Black women in STEM. CHORI Student Summer Research Program gave me an opportunity to have that firsthand experience to interact with patients, essentially living the dream that I have had since I was 3. I want to thank my mentors, Dr. Dayna Long and Robert Mok and to thank Alejandra Plata Zuniga and Lisette Mazon for keeping me under their wings throughout the entire CHORI process.

INTRODUCTION

According to research, socioeconomic issues like housing instability and food insecurity can have a big impact on a person's physical and emotional well-being. To lessen the social and environmental factors that harm the health of our patients and their families, the staff at UCSF Benioff Children's Hospital Oakland started FIND. Since 2016, the Family Information and Navigation Desk, or FIND, has provided families with access to basic necessities including food, housing, and utilities as well as connections to local services as needed. Families and FIND work together to discover unmet needs. Alejandra and Lisette, two navigators at the Claremont Clinic, connect with and assist patients who are referred to FIND. My job at the UCSF BCH Oakland Claremont Clinic is to analyze resource utilization by seeing who is using those resources.

OBJECTIVE

What types of resources are being shared with families and which were utilized? How did the navigator determine it was utilized?

METHODS

I collected my data from the FINDconnect Reporting Dashboard and I stored my data on the Excel platform to ensure security, I uploaded the spreadsheet to the UCSF Sensitive Data folder platforms. Using the FINDconnect Reporting Dashboard, I analyzed what resources patients are requesting and utilizing. I shadowed to gain first-hand experience with the process of the operation of FIND.

ANTICIPATED RESULTS

The main resources that are being utilized will be food, housing, and activities. The way we can track the utilization of the resources is navigators will be following up with families on their current status.

SIGNIFICANCE

Many low-income families asked for food, housing, and extracurricular activities for their kids outside of school. The FINDconnect website has a wealth of information on how to access those resources, including flyers the FIND desk navigators provide for patients. FINDconnect expands the responsibility of medical practitioners to address "social determinants of health" such as hunger, homelessness, mental illness, and developmental issues. FIND's technology enables and increases the technology to address inequities.

Jesus Ortiz del Toro

The Impact of Teaching and Mentoring for Resiliency Among Pediatric Residents

Mentor: Christine Schudel, MSW, MPH
Contributing Authors: April Zaat, MD; Allison Coleman, MD; Christine Trinh, MD

My name is Jesus Ortiz Del Toro and I am a rising senior at Saint Joseph Notre Dame High School. I have always been interested in the sciences since I was very young, however I never believed that I could pursue it as a career because of many stepbacks being a frist-gen mexican migrant. Being in high school and having an opportunity to be in an advance science program let me not only relize that I could do this as a career but that I also enjoyed the journey and what science entails. Chori has allowed me to explore my interests and my curiosity about the human body and find different careers that surrounds it. This interest extends from finding out how to help others medically to researching different diseases and how they affect a person. I would like to thank my mentor christine Schudel for all the time and guidance this summer!

INTRODUCTION

Physician burnout is a significant issue that affects patient care and safety. It is well-documented that physician burnout is high and is often used as an inverse metric for physician wellness. As a safety net hospital, UCSF Benioff Children's Hospital Oakland residents are at increased risk of burnout and vicarious trauma due to its patient populations' higher than average rates of trauma and psychological stressors. Therefore, the residency program aims to address the wellness needs of its resident learners since internal assessments show rising levels of anxiety and mental health concerns. For example, ACGME survey results showed significant burnout rates for trainees, and recent transitions have led to fewer opportunities for senior residents to provide supervision to junior learners, potentially contributing to a decreased sense of mastery and purpose among PGY2 and PGY3 residents. Two novel programs were instituted within the residency program. The first is a resident-created and led advocacy curriculum provided for MS4 students in the form of a virtual advocacy rotation. The second is a PGY-2-specific mentorship program, in which residents volunteer to pair with and mentor 1st-year medical students. Both programs provide opportunities for resident teaching and mentorship which have been linked to promoting resiliency.

OBJECTIVE

Participation in self-selected opportunities for teaching and mentorship among UCSF Benioff Children's Hospital Oakland pediatric residents positively contributes to resilience in training.

METHODS

Focus groups composed of four-six participants each will be conducted over the span of 1-2 years. Data from each focus group will be collected. At the beginning of each focus group, participants will be provided with the study informational sheet. Each focus group will be 1-2 hours in length session. The research team will conduct each focus group using a predetermined set of interview questions, and all sessions will be recorded for data analysis.

ANTICIPATED RESULTS

Residents who participated in either mentor/teaching intervention will report increased feelings of mastery of teaching content and/or an increased sense of purpose in their work.

SIGNIFICANCE

To better understand the role teaching and mentorship may play in combating provider burnout.

Lorena Parsaie

Phenotyping of Maternal Intervillous Monocytes (MIMs) and Fetal Hofbauer Cells (HBCs) with Placental Malaria Using in Situ Hybridization

Mentors: Stephanie Gaw, MD PhD; Nida Ozarslan, MD

Hello! My name is Lorena Parsaie, I am a community college student from Los Medanos College transferring to University of California Los Angeles this fall, majoring in Environmental Science with a minor in Environmental Health. From a young age I had a fascination for solving puzzles and a drive to figure out a solution to any problem. Science has always been my favorite subject in school, I love every aspect of it, and during my first semester of college taking the course Principles of Biology I developed a deep passion for environmental science. I am beyond grateful for the opportunity to participate in the CHORI Student Summer Research program this summer. It has been a wonderful experience that exposed me to the infinite possibilities of science, and gave me real world experience in a wet lab that clarified my desire for a career in research. I want to express my gratitude for the encouragement, guidance, and experience given by my mentors Dr. Stephanie Gaw, Dr. Nida Ozarslan and the SSRP team Dr. Ellen Fung and Dr. David Killilea.

INTRODUCTION

Placental malaria (PM) is a complication of malaria in pregnancy that is characterized by histologic evidence of *Plasmodium* infection of the placental tissue. The placenta transfers nutrients and waste products between the syncytiotrophoblast layer and fetal endothelial cells. PM leads to poor obstetrical outcomes, such as low birth weight, through the disruption of the maternal nutrient exchange and stimulation of the placental inflammatory response. PM is diagnosed by histopathological evaluation of placental tissue using the Rogerson criteria, broadly divided into two categories as active PM and past PM. Active PM is characterized by the presence of *Plasmodium* infected RBCs in the intervillous spaces, and in past PM, only hemozoin accumulation within the placenta is demonstrated.

OBJECTIVE

We hypothesized that the activation states of the MIM and the HBC are different for active PM compared to past PM.

METHODS

We identified the activation states of MIMs and HBCs of 21 samples (active PM=7, past PM=7, healthy control=7) using RNAscope HiPlex v2. We used 5 genes (KRT7, CD68, CD163, FOLR2, and HLADR) and a nuclear stain (DAPI) to identify different cell types and obtained images of 3 regions for each sample using epifluorescent microscopy.

RESULTS

We obtained a detailed analysis of inflammatory responses in both active and past PM through characterizing the activation states of MIMs and HBCs. In past PM and healthy controls, the density of HBCs was significantly higher compared to MIMs. On the other hand, active PM patients had a higher density of both anti-inflammatory (CD68+/CD163+) and pro-inflammatory (CD68+/CD163-) MIMs compared to past PM and healthy controls. The presence of pro-inflammatory MIM in the intervillous space has an inverse correlation with birth weight, suggesting a negative impact of inflammatory response on birth outcomes.

SIGNIFICANCE

The data from our study will increase our understanding of the underlying pathophysiology of placental malaria.

Amber Peake

HIV Status and the Relationship Between Body Composition and Alcohol

Mentor: Jennifer Price, MD PhD
Contributing Author: Phyllis Tien, MD

Hello! My name is Amber Peake and I am a rising senior at the University of California, Berkeley and majoring in Public Health. Following completion of my studies at UC Berkeley, I am planning to pursue a career in medicine and a Master's in Public Health with a focus on underrepresented and vulnerable populations. I grew up in a rural area where healthcare access was limited and I have had my own personal experiences with struggles on my journey. I hope to attend medical school and become a physician to bring my unique experiences to help others. I now see that my challenges are one of my greatest assets. I am forever grateful for CHORI, the wonderful SSRP staff and my amazing mentor Dr. Jennifer Price for believing in me and giving me an opportunity to explore my career path through research and medicine.

INTRODUCTION

Life expectancy of people living with HIV(PLWH) has improved significantly due to advances in antiretroviral therapy. However, it has been found that PLWH have body composition differences compared to persons without HIV, including fat mass atrophy. Despite increased longevity, PLWH are at an increased risk of frailty and changes in body composition. Alcohol intake is assumed to contribute to excess body fatness and changes in body composition. The relationship between alcohol and body composition could potentially mediate frailty in PLWH.

OBJECTIVE

We hypothesize that alcohol use alters body composition of body fat and mediates frailty among PLWH.

METHODS

The Multicenter AIDS Cohort Study (MACS) and The Women's Interagency HIV Study (WIHS) combined to form the longitudinal MACS-WIHS Combined Cohort Study (MWCCS) to provide opportunities to focus on heart, lung, and sleep comorbidities that are known to co-occur with HIV. Around 188 participants enrolled in the MWCC San Francisco site from October 2020-September 2022 answered questions about alcohol use and completed InBody measurements. The InBody determines body composition by sending a small electrical current through the participant measuring the opposition of that current as it travels through the body's water.

ANTICIPATED RESULTS

It is anticipated that alcohol use will alter body composition and mediate frailty of PLWH.

SIGNIFICANCE

Approximately 1.2 million people in the US are living with HIV and about 15,000 people are living with HIV in San Francisco, one of the largest populations of PLWH in the US. Antiretroviral therapies have improved longevity, but changes in body composition present other challenges for PLWH. Understanding how alcohol use could alter body composition could benefit PLWH and the impacts of frailty.

Gael Perez

Augmenting Self-Administered Diet Recall Tool ASA24 Using Video Screen-Share: A Feasibility Study

Mentor: June Tester, MD MPH

Hello! My name is Gael Perez and I am a rising senior at UCLA studying Human Biology & Society. From a young age, I've always known I wanted to become involved in healthcare and science. As a low income, first-generation Mexican-American from the Inland Empire, my experiences and livelihood have shaped my interest to work in medicine and research with an emphasis on practice that aims to uplift underserved communities. With past community-based research experience at UCLA, SSRP has given me the opportunity to become further involved in clinical research and pursue my passion and goals of supporting communities similar to mine, who were critical in my upbringing and opportunities. I'd like to express my gratitude for the immense amount of support and knowledge that I've gained from my mentor Dr. June Tester and the rest of the SSRP staff. My experience interning at UCSF Benioff Children's Hospital will remain with a lasting impact as I aim to pursue either an MPH or MD degree post graduation.

INTRODUCTION

In diet studies, 24-hour recalls are considered the gold standard for diet information. 24-hour recalls require patients to list all the aliments consumed the previous day, producing nutrient data that can be used to analyze the relationship between diet and health.

Diet recalls are frequently conducted at great financial cost by personnel that receive training to interview subjects using a proprietary diet database software (NDSR), however, the NCI has developed a free online tool for researchers called Automated Self-Administered 24-Hour Dietary Assessment Tool (ASA24). ASA24 is designed to allow participants to complete recalls on their own behalf. This can be challenging in low-resource populations with less technology familiarity because of a reliance on images provided by ASA24 to estimate portions.

OBJECTIVE

The purpose of this study is to assess the accessibility, feasibility, and patient satisfaction of completing 24 hour recalls using ASA24 through remote screen-share administration by an interviewer (rather than completing as a self-administered tool).

METHODS

A convenience sample of ten Spanish-speaking individuals will be contacted to participate in 24 hour recalls using ASA24 through video call and screen-share technology (Zoom and Skype). They will complete a recall done on the telephone with use of a printed Food Amounts Booklet to aid estimations. Upon completion of the recall, participants will be asked to rate ease of completion with remote screen sharing, and to compare to using the alternative printed booklet.

ANTICIPATED RESULTS

We expect ASA24 to be completable and provide some degree of patient satisfaction and understanding with the assistance of screen-sharing technology.

SIGNIFICANCE

By analyzing the feasibility of ASA24 through a non-professionally trained interviewer, our team can receive meaningful insights on the experiences of using a free, self-administered tool that makes 24-hour diet recalls more accessible for researchers and participants. These insights can provide the framework for utilizing ASA24 to analyze the relationship between diet and health, especially in under-resourced communities that prove to have widespread access to technology following the COVID-19 pandemic.

Bavana Pydipati

Investigating the Role of SPG21 in Lysosomal Function and Neuronal Health

Mentor: Rose Citron, PhD; Contributing Authors: Rose Citron, PhD; Tony Lurie, PhD Student; Aakriti Jain, PhD; Regina Shin, PhD; Roberto Zoncu, PhD

Hello, my name is Bavana Pydipati, and I am a rising senior at Amador Valley High School in Pleasanton, CA. As I was growing up, I would discuss with my family and friends the newest science concepts I learned in school or the latest scientific discoveries that were being made — so it was no surprise when I realized that science is where my passion lies. Through SSRP, I have been able to observe and participate in scientific research in the "real world." Becoming part of a lab and conducting research alongside established professionals has opened my eyes to aspects of the field I had never before considered, such as the collaboration in science. All the knowledge and support I have gained and the challenges I have faced through SSRP have been immensely helpful in my path toward becoming a better scientist. I am very thankful to the organizers of SSRP, my mentor Dr. Rose Citron, and all the others at the Zoncu Lab at UC Berkeley for providing me with this invaluable experience.

INTRODUCTION

To maintain cellular homeostasis, cells must recycle cellular components and dispose of damaged proteins and organelles. Autophagy is the process by which these materials are captured and delivered to an acidic compartment, the lysosome, for degradation. Impaired autophagy or lysosomal function is implicated in numerous diseases and, in particular, is associated with neurodegenerative disease, as lysosome function is essential for neuronal health. Mutations in the gene Spastic Paraplegia 21 (SPG21) are the underlying cause of Mast Syndrome, a neurodegenerative condition. However, the function of SPG21 remains unclear, as does its localization in the cell. We suggest that the function of SPG21 is at the lysosome and is required for proper function of lysosomes, and its absence leads to dysfunctional autophagy.

OBJECTIVE

The purpose of this study is to determine if SPG21 localizes to lysosomes and if disruption of SPG21 leads to impaired autophagy and lysosomal degradation in model cell lines and iPSC-derived neurons.

METHODS

To determine SPG21's location in the cell, we performed an immunofluorescence (IF) assay to stain for LAMP2, a lysosomal protein, and SPG21, allowing us to measure the colocalization of SPG21 with lysosomes. To address SPG21's role on the lysosome, we harvested whole cell lysate from SPG21 knockdown and control cells and initiated autophagy by treating cells with different autophagy modulating drugs. Also, using a process called Lyso-IP, we isolated intact lysosomes and harvested the contents to look for differences in autophagy machinery and substrate delivery to the lysosome. A Western blot was run on these samples to assess the abundance of proteins of interest. Finally, to begin to address the role of SPG21 in neurons and disease, we determined if SPG21 is expressed in undifferentiated iPSCs and differentiated i3 cortical neurons using a Western blot of SPG21.

ANTICIPATED RESULTS

We anticipate to see colocalization of SPG21 with the lysosome in the IF staining. Additionally, we expect that the expression of autophagic proteins in the Western blots is lower in the SPG21 knockdown cells, suggesting that dysfunctional SPG21 results in impaired autophagy.

SIGNIFICANCE

We hope to uncover SPG21's role in the cell and the mechanism by which dysfunctional SPG21 leads to Mast Syndrome. Additionally, we hope to learn more generally about lysosomal function in neurons and how breakdown of the autophagy-lysosomal system leads to neurodegenerative disease.

Maria Ramirez-Vicente

Increasing the Usage of MyChart to Improve Health Equity in an FQHC

Mentor: Mariamawit Tamerat, MD
Contributing Author: Robert Mok

Hello!!! My name is Maria Ramirez-Vicente and I am a rising freshman student at University of California Irvine. My plan is to major in Psychological Sciences in hopes to pursue further education in either medical school to become a Pediatrician, or physical therapy school to become a Physical Therapist. As a first-generation Guatemalan Hispanic, I have seen many inequalities that happen around my community in the medical field, myself included. This issue is something that I have grown a passion for and strive to leave a positive impact on my community by pursuing a career in the medical field to represent my Hispanic community. I have worked on many projects relating to racial injustice in healthcare and have shadowed many mentors in different programs that took place in a medical setting. My ultimate goal is to work hard this summer alongside with my mentor, Dr. Mariamawit Tamerat, and find ways in which we can better improve equality in the healthcare system, one step at a time.

INTRODUCTION

The application MyChart was created for patients with the goal of providing easy access to manage a patient's healthcare, benefiting both families and healthcare providers. MyChart is able to grant patients the access to their healthcare. At UCSF, the groups experiencing this inequity in healthcare access are primarily patients of Black and Latinx/ Hispanic ethnicity, and those patients with Limited English Proficiency (LEP). Although these features are accessible and are frequently recommended, data of patient activity on MyChart shows there is a large disparity when it comes to activation/usage towards the underserved community.

HYPOTHESIS

Many MyChart users who do not use the application frequently are due to perceived barriers they face: limited English proficiency, a lack of awareness of the features/benefits, as well as the lack of electronic access to the application.

METHODS

We will survey a group of patients who are underserved communities and who receive care at a Federally Qualified Health Center, UCSF Benioff Children's Hospital Oakland, to identify barriers that might exist during the usage of MyChart.

ANTICIPATED RESULTS

We expect to notice patterns in patients, who do not use MyChart frequently, to have similar answers and issues to one another. We hope to receive at least 20 patient/family responses and find possible solutions to issues that are being mentioned frequently.

SIGNIFICANCE

There are many patients who are unaware of the benefits MyChart has and this is due to perceived barriers: limited English proficiency, a lack of awareness of the features and benefits, as well as, a lack of electronic access. By providing easy, accessible knowledge to patients and families on how they can manage their own healthcare by accessing MyChart's benefits and features will create an increase in improvement in equitable access to healthcare, as well as more activity in the usage of the MyChart application. These groups of patients will be able to benefit from improved and easier healthcare access, impacting the quality of care that patients are able to receive.

Xiomara Rodriguez

To Zoom or Not to Zoom? Patient Preferences for Clinic Types in Medical Genetics

Mentor: Joyce So, MD PhD
Contributing Author: Fion Ma

Hey! I'm Xio Rodriguez, a rising junior at Johns Hopkins University on the premed track. I'm majoring in Medicine, science and the humanities (MSH), and Spanish. Prior to this program, I was unsuccessful at obtaining a research position at my school despite it being a top research university. Research was always something that I wanted to try and I'm thankful to SSRP for allowing me to explore this field and new fields in medicine. Mitigating health disparities has been a passion of mine that I developed in high school and strengthened in college and I was so excited that my summer project would touch on a large aspect of this issue, access to quality medical care. Through my work with Dr. So and Fion Ma, I'm able to obtain a glimpse at what the future of medical clinics will look like and this program has reinforced my dream to work in the medical field one day.

INTRODUCTION

The COVID-19 pandemic accelerated the use of telehealth to ensure continued access to care. Many studies have reported high patient satisfaction with telehealth before and during the pandemic. While the efficacy and satisfaction with telehealth have been studied in specific specialties, there is little information on patient preferences for telehealth vs in-person clinics in medical genetics, particularly in the post-pandemic era.

OBJECTIVE

This quality improvement project utilizes patient surveys to ascertain patient preferences and satisfaction with telehealth and in-person visits in the UCSF Adult Genetics and Preventive Genomics Clinic, BCH-SF Pediatric Genetics Clinic, and BCH-Oakland Pediatric Genetics Clinic. We hypothesize that there will be a general preference for telehealth vs in-person. The results of this study will aid in the planning of visit types that will be offered in the future in the Division of Medical Genetics.

METHODS

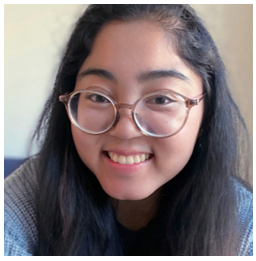
Patients are sent a short Qualtrics survey via email that includes questions about their medical genetics new patient visit, as well as preferences for future genetics visit type one week after their first appointment with a UCSF Genetics clinic. Two reminder emails are sent out in the following 2 weeks if the survey is not completed.

ANTICIPATED RESULTS

Within the first few weeks of data collection, 18 out of 129 people (14%) have responded to the survey. We anticipate a total response rate of 15-20% within this pilot period (6 weeks). Of responses received to date, 78% of respondents would have preferred their new patient appointment to be through Telehealth. We will report on the proportion that prefer telehealth vs in-person clinic appointments for new vs. follow-up visits, and the factors that influence those preferences.

SIGNIFICANCE

The pandemic shifted the way people think of telehealth, embracing its accessibility. By understanding the "whys" of the patient experiences and preferences for clinic appointment type, the clinics can offer the appropriate types of services that will improve the quality of care received and patient satisfaction with their clinical experience in the Division of Medical Genetics.



(Geomarie) Ashley Saldaña

The Social Epidemiology of Binge-Eating Disorder and Behaviors in Early Adolescents

Mentor: Jason Nagata, MD

Hello! My name is Ashley Saldana, and I am an undergraduate student at the University of San Francisco majoring in Chemistry. I joined SSRP because medicine and patient care are things I'm passionate about, and I want to better understand the factors impacting patient health through research. As ambassador coordinator for the RecoverED project, an eating disorder nonprofit, and incoming behavioral health director for Mabuhay Health Center, I have the privilege of advocating for and working with patients struggling with all sorts of issues. What I've found through this, and my own lived experience is how debilitating a diagnosis can seem and how powerful research can be in transforming lives and providing hope, especially for those struggling with what can seem to be an all-encompassing life-sentence. As an aspiring child and adolescent psychiatrist for patients with eating disorders, I am forever grateful and thankful to my mentor, Dr. Jason Nagata (who himself works with eating disorder patients) and the opportunities and guidance he has given me throughout this program. I am excited to use the tools and connections I have made through this program, and endeavor to become the best patient advocate and provider I can be.

INTRODUCTION

Binge-eating disorder (BED) is the most common eating disorder phenotype and is linked to several negative health outcomes. Yet, little is known about the social epidemiologyof BED, particularly in early adolescence.

OBJECTIVE

To examine the associations between sociodemographic characteristics and BED and binge-eating behaviors in a large, national cohort of 10–14-year-old adolescents in the US.

METHODS

We conducted a cross-sectional analysis of data from Year 2 of the Adolescent Brain Cognitive Development (ABCD) Study (2018–2020) that included 11858 early adolescents (10–14 years) in the US. Multivariable logistic regression models were used to assess the associations between sociodemographic characteristics and BED and binge-eating behaviors, defined based on the Kiddie Schedule for Affective Disorders and Schizophrenia.

RESULTS

In this early adolescent sample (48.8% female, 47.6% racial/ethnic minority), the prevalence of BED and binge-eating behavior were 1.0% and 6.3%, respectively. Having a household income of less than $75,000 (AOR: 2.02, 95% CI: 1.21 - 3.38) was associated with greater odds of BED. Being male (AOR: 1.25, 95% CI: 1.02 - 1.52), of Asian (AOR: 1.67, 95% CI: 1.03 - 2.70), or Native American (AOR: 1.63, 95% CI: 1.01 - 2.64) descent, having a household income less than $75,000 (AOR: 1.40, 95% CI: 1.13 - 1.74), or a sexual minority status (AOR for 'Yes' Response: 1.87, 95% CI: 1.24, 2.83 and AOR for 'Maybe' Response: 1.82, 95% CI: 1.17 - 2.84) were all associated with higher odds of binge-eating behaviors.

SIGNIFICANCE

Several sociodemographic variables showed significant associations with BED and binge-eating behaviors, which can inform targeted screening, prevention, and education campaigns for BED among early adolescents.

Zalyia Sharkey

Urinary Tract Infections in Children and Assessing the Knowledge of Families on Clean Catch and Catheter Collection Methods

Mentor: Prachi Singh, DO

Hello all! My name is Zalyia Sharkey. I am a rising senior at Antioch High School. I am currently undecided on the path that I want to take in my future but I know I want to pursue a career in the health sciences field. I have always had an interest in biological as well as psychological studies. I decided to join the CHORI SSRP Internship over my summer to gain experience in a research job and grow my knowledge of possible careers within the Biotechnology field. I am working with my mentor in studying UTIs and determining the amount of knowledge families are educated on in the collection process of UTI samples. The collection process of UTIs can determine treatment processes and it is important to know how to treat a child as improper medical diagnosis can lead to an array of complications. I want to thank Prachi Singh, my mentor, for guiding me through my learning journey in the pediatric medical field and striking curiosity within me throughout our project.

INTRODUCTION

Children are fairly susceptible to Urinary Tract Infections (UTIs) in which around 1 in 30 children are affected. A urine culture is used to test for these infections in children and requires a clean-catch urine sample. Only 20% of urine samples end with successful results that don't include dirty-catches, or urine samples with negative results. This study will determine the effectiveness of collection procedures and evaluating the amount of knowledge families have prior to collecting samples.

OBJECTIVE

Patients who are given clean catheter urinalysis instructions versus previously noted clean catch specimens and diagnostic sample surveillance will improve with added instructions to the families.

METHODS

We will conduct a study determining the effectiveness of collection methods of urine samples when looking for infections of the urinary tract in children. The study will determine if the amount of knowledge gained in parents translates to positive or negative UTI results. We will contact families in regards to receiving instructions from a medical professional on how to collect a specimen from their child.

ANTICIPATED RESULTS

We aim to determine the relevance of educating families and relating it to how well they can collect samples from their children which will aid in receiving positive urine culture results when looking for infections of the urinary tract.

SIGNIFICANCE

Collecting accurate results when testing for UTIs in children is of the most importance when diagnosing. False diagnoses can lead to mistreatment and unnecessary antibiotic medication leading to possible antimicrobial resistance, which often leads to kidney problems and severe infections. The goal of our project is to better the quality in which staff and patients communicate when it comes to collecting samples.

Jason Tesfa

Potential Disparities in Testing for UCSF500 Genetic Analysis of Pediatric and Young Adult Tumor Patients

Mentor: Anurag Agrawal, MD

Hello! My name is Jason Tesfa and I am a rising sophomore at San Francisco State University majoring in Biology with a minor in Race & Resistance Studies. When my mother was diagnosed with fourth stage lymphoma, it made me want to do more than just sit in the waiting room for the results and made me realize the health disparities in healthcare especially in the communities I belong to: Ethiopian & Fijian. I became fascinated by potential clinical trials that could help cure my mom. UCSF SSRP further ignited this curiosity by allowing me to discover my love for patient care and clinical research when shadowing my mentor, Dr. Anurag Agrawal, as well as working on my research project with Dr. Deborah Gho at UCSF Benioff Children's Hospital Oakland. This program gives me hope that I can pursue a career in medicine and make an impact on the world. Many thanks!

INTRODUCTION

The UCSF500 Cancer Gene Panel Test is an advanced molecular DNA-based test that uses capture-based next-generation sequencing to target and analyze 529 cancer genes. The test identifies mutations that are present in both tumor and germ cells that may drive tumor growth and guide targeted therapies. Since its implementation in 2015, testing has not been routinely sent for all patients with a new oncology diagnosis at UCSF. Rather, tests are selectively sent off only for patients who are deemed high-risk, have poor response to therapy or are difficult to treat or diagnose with standard approaches. However, for some patients, the findings of the UCSF500 have improved tumor classification, guided the therapeutic course and have even modified the diagnosis.

OBJECTIVE

The aims of this project are to determine whether disparities in testing currently exist based on baseline patient/family sociodemographic features. We aim to utilize these data to propose a data driven approach for genomic testing and to eliminate any testing disparities, if they exist.

METHODS

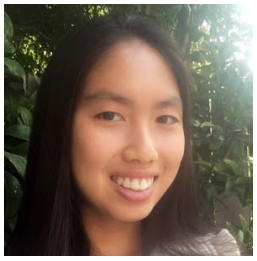
Through an exhaustive list of new and relapsed tumor diagnoses from 2018-2022, we will use the medical record number (MRN) to codify patients as well as their electronic health records to collect their characteristics. Logistic regression analyses will be used to estimate the unadjusted odds ratio and corresponding 95% confidence intervals for UCSF500 testing. Characteristics that are hypothesized to affect testing a prior or those found to be associated with testing (p- value <0.05) will be included in a multivariable model to obtain adjusted odds ratios and determine significant variables.

ANTICIPATED RESULTS

I anticipate that non-white race tumor patients and patients with public insurance are associated with decreased access to the UCSF500 test based on a similar study done previously. Also, I expect to see an increase in the amount of UCSF500 tests sent out over the years with increased knowledge of the test and refined guidelines.

SIGNIFICANCE

This study highlights the importance of eliminating disparities in sending out the UCSF500 test and making it a routine procedure to ensure the most accurate diagnosis and possibly identifying targetable treatment modalities, which ultimately impact the health of many individuals.



Michelle To

Assessing Alkaline Phosphatase as an Indicator of Zinc Deficiency When Diagnosing Pediatric IBD

Mentors: Christine McDonald, ScD, MS; Sofia Verstraete, MD

Hello! I'm Michelle To, and I am a rising freshman at Stanford University. Growing up, I've watched my family struggle with chronic illness after illness: diabetes, obesity, cardiovascular disease, liver disease, Alzheimer's disease, and more. Watching them swallow pill after pill, I continue to wonder: why are they suffering? How can they get better? What are we doing now, and how can we improve? At SSRP, I am truly grateful to have met so many mentors to support me in tackling these questions together—thank you to Dr. McDonald and Dr. Verstraete, Dr. Fung and Dr. Killilea, Dr. Qin, Dr. Li, Dr. Batish—and I am so glad to have a community that celebrates diving deeper and healthier lives for others.

INTRODUCTION

Zinc deficiency is common in pediatric patients with inflammatory bowel disease (IBD), but serum zinc concentrations (SZC) may not be routinely measured at the time of diagnosis due to cost and logistical considerations. Instead, low alkaline phosphatase (ALP) concentrations may be used as a proxy indicator of zinc deficiency. However, ALP's ability to predict zinc nutritional status in this population is unclear.

OBJECTIVE

Our objective is to identify factors associated with SZC measurement and investigate the association between SZC and ALP levels in pediatric IBD patients at the time of diagnosis.

METHODS

This is a retrospective study of all active UCSF patients aged 0-21 years of age with an IBD diagnosis and at least one comprehensive metabolic panel (CMP) within one week of diagnosis. First, we will use descriptive statistics to characterize the IBD patient population and describe mean ALP and SZC concentrations conducted within one week of diagnosis. We will use regression modeling to identify clinical, anthropometric, nutritional and biochemical characteristics associated with SZC and ALP concentrations at the time of diagnosis. Finally, in the subset of patients with both biomarkers available at the time of diagnosis, correlation and Bland Altman analyses will be used to compare ALP with SZC concentrations.

ANTICIPATED RESULTS

We expect that ALP will be positively correlated with SZC and that indicators of inflammation and disease severity be inversely associated with SZC. We hypothesize that we will find evidence to reject the null hypothesis that ALP levels are the same in patients who receive and those who do not receive zinc supplementation and/or serum zinc tests.

SIGNIFICANCE

Testing whether ALP is an appropriate proxy for low SZC is essential in evaluating zinc deficiency and the need for zinc supplementation in pediatric IBD patients at UCSF. However, additional research will be required to evaluate the association between ALP and SZC over time, and in response to zinc supplementation.

Jennifer Tran

The Incidence of Pathogenic Germline Mutations Across Pediatric and AYA Tumors

Mentors: Arun Rangaswami, MD; Jennifer Michlitsch, MD

Hi! My name is Jennifer Tran, and I'm a rising senior at Oakland Military Institute. In college, I plan to pursue a STEM major (still deciding!) with a minor in psychology. Ever since I was little, I was drawn to science; I enjoyed learning about science, experimenting with my hands, and the vast possibilities that came along with the field. I hope to pursue a career in medical research to help in the advancement of medical technologies. I am incredibly thankful to my mentors, Dr. Jennifer Michlistch and Arun Rangaswami, for helping me navigate through my first experience in research as well as the SSRP leadership for giving me the opportunity to participate in this program.

INTRODUCTION

Germline mutations, which are often inherited, are gene changes in reproductive cells integrated into all offspring cells. To detect such mutations, germline genetic testing, a process that involves examining "normal" cells in the body through DNA sequencing, is used. Certain gene variations put patients at an increased risk for specific cancers. Generally, it has been found that approximately 10% of children with cancer have an underlying germline mutation in a cancer-predisposing gene. It has also been well-established that implementation of surveillance screening in patients with cancer predisposition syndromes leads to earlier detection of tumors and improved outcomes. At the University of California San Francisco, many of our oncologists use the UCSF500 test for both somatic and germline profiling of pediatric cancer patients.

OBJECTIVE

To determine the incidence of pathogenic germline mutations in pediatric, adolescent, and young adult patients who have undergone UCSF500 testing, across age groups and tumor types, and to determine the most common genes involved.

METHODS

We performed a retrospective analysis of de-identified data generated from the UCSF500. We are particularly focused on examining the data on the pathological diagnosis of tumors, age of patient at sequenced tumor collection, vital status, and gene alterations in patients with germline-positive findings. Age groups are divided into 0-2, 3-5, 6-13, 14-18, 19-33, and 34-38 years.

RESULTS

Strikingly, 18.2% of cancer patients who underwent the UCSF500 had a germline-positive finding. The incidence of a germline mutation was 21.5% for ages 0-2, 17.2% for ages 3-5, 14.7% for ages 6-13, 23.4% for ages 14-18, 23.7% for ages 19-33, and 10.3% in ages 34-38. TP53, NF1, and MUTYH were the most prevalent germline alterations, respectively accounting for 12.3%, 11.5%, and 7.4% Among the most significant tumor types, germline mutations were found in 75% of MPNSTs with 83.3% being NF1; 70% in neurofibromas with 60% being NF1; 50% in retinoblastomas with all being RB1; 35.7% osteosarcomas with 55.6% being TP53; 31.6% in glioblastomas with 21.1% being PMS2; and 30.4% in rhabdoid tumors with 71.4%s being SMARCB1.

SIGNIFICANCE

The findings of this study may be used to improve early diagnosis of germline mutations, genetic counseling, family testing, and patient surveillance screening procedures, leading to improved outcomes for cancer patients.

Jenny Tran

A Study of Food Protein Induced Enterocolitis Syndrome (FPIES) On Eggs

Mentors: Angela Chang, MD and Jonanthan Witonsky, MD MAS

My name is Jenny Tran, I am an incoming freshman at UC Berkeley. I will be getting my bachelors in microbial biology, with the intention of working in healthcare. Since I was little I have always gravitated towards helping people feel better, tied with my love for science I believe there is no better place for me than working in healthcare. Being an alumni, I have had the chance of working in a laboratory and in a clinic, thanks to my mentors this year Dr. Angela Chang and Dr. Jonathan Witonsky I have found that working with patients is where I want to spend my time. Because of CHORI I have had the chance to explore my options in medicine and explore fields I have never known. Ultimately CHORI has reassured me that going into medicine is the right choice for me.

INTRODUCTION

Food Protein Induced Enterocolitis Syndrome (FPIES) is a type of food allergy that can present with gastrointestinal symptoms such as vomiting, diarrhea, and dehydration. Unlike the more common IgE-mediated food allergies, which are characterized by hives, itchies, swelling of the throat, and anaphylaxis, FPIES–a non-IgE mediated food allergy–is far less common. A recent study suggests that children with cow's milk FPIES can tolerate extensively heated cow's milk in a baked good, and this may expedite resolution of FPIES. However, there are no published studies exploring if patients with egg FPIES can similarly ingest extensively heated eggs.

HYPOTHESIS

Patients with egg FPIES of older age with negative egg skin tests and specific IgE tests are more likely to tolerate extensively heated egg and outgrow egg FPIES.

METHODS

We will begin by determining unique patient identifiers (i.e., medical record numbers) for target patients by querying the UCSF EHR database.

We will develop a new database management tool in RedCap that is designed to capture patient specific variables (i.e., age, sex, age of onset, symptoms) and OFC related variables (i.e., age at the time of challenge, outcome of challenge). Then we will use Children seen at the UCSF Pediatric Allergy Center between January 2015 and June 2023 with an egg-triggered FPIES diagnosis who underwent an oral food challenge with egg. We will manually review each patient's electronic medical record to document the variables into RedCap. Finally, we will proceed to analyze relationships between our primary outcome of interest and predictor variables.

ANTICIPATED RESULTS

We aim to identify variables that predict the outcome of oral food challenges to eggs or extensively heated eggs in baked goods. We will quantify how many patients pass and if there are any patient specific variables such as age or specific IgE testing or skin prick tests that correlate with passing.

SIGNIFICANCE

By understanding what patient specific variables are predictive of tolerating extensively heated eggs or outgrowing egg FPIES, we can better counsel families on timing of food challenges and the natural history of this disease.

Jordan Walton

Got Milk? The Effect of Chocolate Milk on Post-Exercise Recovery – A Systematic Literature Review

Mentor: Ellen Fung, PhD RD

My name is Jordan Walton. I am a senior at Chapman University majoring in Applied Human Physiology, with a minor in Psychology. Upon graduation, I would like to attend graduate school at USC, UCLA, or Long Beach State focusing on Kinesiology and Biomenchanics. After attending graduate school, I want a career working for an athletic company where I am able to conduct research on athletes' movements and the environment they play in with regards to their footwear and apparel. My goal is to utilize the knowledge and research to enhance athletic apparel thus giving athletes a competitive edge. The CHORI program has helped me further my research skills and learn more about how to properly conduct a study. Feeling stuck and making errors is something that I struggle with, however with the help of Dr. Ellen Fung, I am learning to persevere through these challenges and feel good about the work I produce.

INTRODUCTION

Post-exercise recovery is important to prepare the elite athlete for the next training session or athletic event. An optimal recovery regimen involves rest, stretching, hydration and nutrition. Most athletes think of sports drinks such as Gatorade® and Powerade® after a bout of exercise, to help replace the electrolytes that are lost. While these drinks are heavily marketed, they may not provide optimal benefit. Over the past decade, chocolate milk (CM) has increased in popularity as an alternative to sports drinks. CM contains more electrolytes (sodium, potassium, magnesium) than Gatorade®, has a carbohydrate to protein ratio that is optimal for glycogen replacement and also contains calcium and vitamin D which are beneficial to bone health. However, the scientific basis of CM has yet to be fully explored. In order to determine the effectiveness of CM on post-exercise recovery, a systematic literature review was performed.

HYPOTHESIS

CM will have a greater benefit towards an athlete's post-exercise recovery compared to sports drinks.

METHODS

A systematic literature review was conducted using the following search engines: PubMed, Web of Science, and Embase; and the following search criteria: (athlete OR sports) AND "chocolate milk". Articles were limited to published randomized control trials of post-exercise recovery performed between from 2006 to 2023.

RESULTS

Eight articles were included in the review including: 79 participants (59M:20F), 15-35 years old, participating in 6 different sports (Badminton, Cyclist, Judo, Soccer, Track, Triathlon). Seven of the 8 articles reported positive effects of CM on perceived rate of exhaustion while 4 reported a delayed onset of muscle soreness with CM compared to sports drinks. Another 4 reported improved VO2 max, which is a measure of maximal oxygen consumption, while two showed improved glycogen storage or synthesis with CM compared to sports drinks.

SIGNIFICANCE

These findings show the benefit of CM consumption at reducing exhaustion and muscle soreness after exercise while also improving glycogen storage capacity. Further research is necessary to explore the effects in a broader range of athletes. If CM is proven to be highly effective, it might replace sports drinks as the 'go to' beverage in the locker room not only for its post recovery benefit but also for its potential to improve bone health of athletes.

Eirini Williams

Improving Patient Care and Tuberculosis Diagnosis Using a Patient Survey at the Berkeley Free Clinic

Mentor: Mai Baalbaki, MD MSc

Hello, my name is Eirini Williams and I will be a sophomore at Cornell University! My interest in public health started when I learned about the struggles of hunger, food deserts, and obesity in the United States in fourth grade. I decided to participate in SSRP because I wanted to challenge myself by networking with like-minded people and participating in research that will change the world. This program gave me the chance to achieve this and more. Working at the Berkeley Free Clinic has been such an enriching experience because I get to conduct research while seeing patients and learning about how health clinics operate. It is amazing to see how my research projects directly impact the community and I cannot wait to apply these skills to my future endeavors. I am so grateful for the SSRP leadership team and my mentor Dr. Mai Baalbaki for making this experience unforgettable.

INTRODUCTION

Tuberculosis (TB) is a serious bacterial infection caused by *Mycobacterium tuberculosis.* The bacteria primarily infect the lungs but can also attack any part of the body. Most infections develop into non-infectious latent TB, but a minority progress to active TB. There are an estimated 13 million people in the US living with latent TB with 8,300 new active TB cases reported annually. Despite the availability of antibiotic treatments, TB diagnosis and treatment remain a challenge, disproportionately impacting vulnerable populations, unhoused individuals, and immunocompromised patients.

HYPOTHESIS

Development of TB assessment protocols informed by patients can improve the accessibility and effectiveness of TB testing and treatment.

METHODS

To determine improvement areas for TB care and treatment, patients were asked to complete a survey prior to their TB appointment. Survey questions were both open-ended and Likert scale format. Collected data included demographics and information on barriers to TB care. Patient information was anonymized at the time of collection. Descriptive statistics will be used to analyze quantitative data, while the free response questions will be examined for thematic analysis. Survey information will be used to develop patient-centered TB screening and treatment strategy.

ANTICIPATED RESULTS

We expect the survey results will show that many Berkeley Free Clinic patients face multiple barriers to accessing care. We anticipate that understanding these barriers to care can inform TB screening and treatment. We foresee that implementing the patient survey will result in better patient outcomes and less disparities in the distribution of healthcare services.

SIGNIFICANCE

Incorporating patient recommendations obtained from patient surveys, can lead to enhanced TB protocols for current patients and the wider community. This can improve patient outcomes leading to a more equitable distribution of healthcare services.

Phoeben Worku

Characterizing Lipoprotein Particles in the Unclassified Midzone

Mentors: Sarah King, PhD; Ronald Krauss, MD
Contributing Author: Alison Killilea, PhD

Hello, my name is Phoeben Worku and I'm a rising senior at Berkeley High School. I've had a passion for science from a young age and have always loved pursuing opportunities to develop it. As I got older, I became interested in the innovation side of medicine and began to explore how it intersected with the field of engineering. In the future, I hope to study biomedical engineering and do work to develop medical treatments and devices that are greatly accessible and affordable. I appreciate the SSRP leadership team for providing me the opportunity to get an introduction to biomedical research. I'd also like to thank my mentors, Dr. Sarah King and Dr. Ronald Krauss, Dr. Alison Killilea, as well as everyone I worked with in the Krauss and Medina Labs for all the support I received this summer and an amazing learning experience.

INTRODUCTION

Lipoproteins are complex particles composed of a non-polar lipid core surrounded by phospholipids, free cholesterol, and apolipoproteins. Lipoproteins are classified by their size and composition. High-density lipoprotein (HDL) is characterized by the presence of apolipoprotein A1 (apoA1), and low-density lipoprotein (LDL) is characterized by apolipoprotein B100 (apoB100). Lipoprotein particles can be measured by ion mobility, which detects novel particles referred to as "midzone" because they are found between HDL and LDL particles in terms of diameter. The midzone is not well characterized, but has been associated with increased risk for cardiovascular disease (CVD) and all-cause mortality in patients taking statins.

HDL biogenesis occurs mainly in the liver through secretion of ApoA1. Complement C3 (coC3), an inflammatory protein, is also synthesized in the liver and we are interested in understanding whether coC3 associates with nascent ApoA1-containing HDLs during their biogenesis and what factors regulate this particle. iPSC-derived hepatocytes could serve as a model for understanding the mechanism by which different subspecies of HDL (and midzone) are produced.

OBJECTIVE

We will verify the presence of coC3 on ApoA1-containing particles from human plasma and determine the diameter of these particles to ascertain whether they make up part of the midzone. We will also determine whether coC3 co-localizes with apoA1 in primary hepatocytes.

METHODS

Using native gradient gel electrophoresis and immunoblotting, we will determine whether apoA1-containing particles isolated from plasma from de-identified individuals contain coC3. We will use immunofluorescence to determine whether this inflammatory protein colocalizes with ApoA1 in primary hepatocytes. We will explore the possibility of using iPSC from individuals with different risk factors to understand how different subspecies of HDL (and midzone) are synthesized.

ANTICIPATED RESULTS

We anticipate that we will detect coC3 in HDL and midzone isolated from human plasma and that coC3 and ApoA1 will co-localize in human hepatocytes.

SIGNIFICANCE

The inflammatory protein content carried by a subset of HDL/midzone particles may be a risk factor for CVD so understanding the origin and composition of these particles could have implications for the treatment and prevention of CVD.

Erika Zagni

Evaluating the Effects of Genetic Variability in Parkinson's Disease Physiology

Mentor: Stephanie Sandoval-Pistorius, MS, PhD
Contributing authors: Philip Starr, MD, PhD, Melanie Morrison, PhD

Hello! My name is Erika Zagni, and I am a rising second-year neurobiology major at the University of California, Irvine. Last year, I had the opportunity to participate in this program, during which I worked on a research project focused on treating Parkinson's Disease with stem cells. The experience instilled a sense of hope in me and ignited my passion for neurodegenerative diseases and regenerative medicine. I am thrilled to be back at UCSF this summer as an alumni and peer mentor, continuing my research on Parkinson's Disease treatments, this time studying deep brain stimulation, while also enhancing my mentoring skills. My ultimate dream is to make significant research contributions that will help eradicate neurodegenerative diseases, leaving them firmly in the past. I intend to pursue a Ph.D. in neuroscience to delve deeper into the field of regenerative medicine within the context of neurodegenerative diseases. My long-term goal is to establish and lead a research laboratory as a professor and principal investigator, where I can mentor and teach students from disadvantaged backgrounds, just like mine. I am determined to show my students that we all belong in STEM. I would like to express my heartfelt gratitude to my mentor, Dr. Stephanie Sandoval-Pistorius, and the SSRP leadership for their invaluable guidance, kindness, and infinite patience.

INTRODUCTION

Parkinson's Disease (PD) is a neurodegenerative disease that is caused by the degeneration of dopaminergic neurons in the substantia nigra, characterized by motor dysfunction such as tremors, bradykinesia, and rigidity. PD symptoms correlate with pathological beta (13-30 Hz) brain activity where symptom severity correlates with the magnitude of beta activity. While PD is largely idiopathic, a recent study has shown that at least 14% of PD patients have a genetic form of Parkinson's disease. The most common PD-linked mutations are found in the Leucine Rich Repeat Kinase 2 (LRRK2), glucocerebrosidase (GBA), and Parkin RBR E3 Ubiquitin Protein Ligase (PRKN) genes. Deep brain stimulation (DBS) is a surgical intervention for PD that alleviates symptoms, including those not controlled with medication, while also decreasing medication-induced side effects. PD treatments, both medication and DBS, lead to decreased beta activity. While genetic status is generally not considered when assessing patients for DBS, previous studies have found that genetic status may impact DBS outcomes, including motor and cognitive outcomes. However, the effects of genetics on DBS modulation of pathological brain activity are not well understood. This study aims to explore if genetic status plays a role in DBS modulation of pathological beta activity.

OBJECTIVE

Characterize and compare pathological oscillatory activity in patients with and without genetic forms of Parkinson's disease.

METHODS

Local field potential recordings were performed in Parkinson's patients implanted with a bi-directional DBS system (Percept PC, Medtronic Inc, n=3). DBS lead placement will be reconstructed onto a normalized brain space (Montreal Neurological Institute) use LEAD-DBS (n=10).

ANTICIPATED RESULTS

As this is an exploratory study, we do not anticipate having the power to identify statistically significant differences between genotype. However, our observations will begin to allow us to form hypotheses for future studies.

SIGNIFICANCE

This study is the first to assess the impact of genetics on pathological brain activity in PD and will lay the foundation for future studies on the topic. This work has the potential to inform decisions surrounding DBS for patients with genetic forms of PD.

Natalya Zuberi

Determining Whether Irradiated Riboflavin Has An Anti-tumoral Effect on Precancerous Barrett's Esophagus Organoids

Mentors: Matthew Stachler, MD PhD and Jordana Maria-Azevedo Martins, PhD

Hi! I'm Natalya Zuberi. I am a rising second year at Lafayette College, a small school in Pennsylvania, with a major in Biology. My initial interest in biology arose during the habitat unit in 3rd grade science. Each student had to research one animal and make a shoebox diorama of their habitat, explain their diet, behaviors, etc. While researching polar bears, I was blown away by all the things I didn't know. Since then, I have had an interest in learning random facts about animals, their biology, and their behaviors. As middle school started, that interest spread to human biology as well. When I was 12, my mom was diagnosed with breast cancer. Her doctor was able to create a treatment plan that excluded chemotherapy. He helped me realize that my interest in biology was more than a hobby and could help people. Currently, I am not sure whether I would like to practice medicine or research. Lastly, I would like to thank Dr Stachler and Jordana Azevedo Martins for this amazing opportunity.

INTRODUCTION

Barrett's esophagus (BE) occurs when long-term gastroesophageal reflux disease (GERD) causes the normal squamous lining of the esophagus to be replaced by mucin-secreting columnar cells. Sometimes, BE can progress to dysplasia and ultimately esophageal adenocarcinoma (EAC). Riboflavin (vitamin B2) is a mineral involved in normal cellular function and growth. Irradiated riboflavin (iRF) has been found to have anti-tumoral effects in certain cancers and anti-proliferative and anti-metastatic effects in other cancers. The effects of iRF on BE and EAC are unknown.

OBJECTIVE

Irradiated Riboflavin will have an anti-tumoral effect on BE organoids and disrupt the organoid structures, therefore, affecting the progression to esophageal adenocarcinoma.

METHODS

Primary human BE cells were grown in 3D cultures, including organoids and an air-liquid interface. Varying concentrations of iRF were added to the media. The growth of the BE cells with and without iRF was monitored in order to determine if riboflavin can have an anti-tumoral effect on BE organoids. Cell-cell adhesion, proliferation, and apoptosis will be graded using immunohistochemistry.

ANTICIPATED RESULTS

We expect the addition of iRF to the BE cells will partially disrupt cell-cell adhesion, which will disrupt the organoid and epithelial cell surfaces in the ALI, leading to decreased growth and proliferation. We expect these results to be more pronounced in more advanced cells (high-grade dysplasia and cancer). Additionally, we expect an associated cell death. We expect all results to be more severe in higher concentrations of iRF.

SIGNIFICANCE

If iRF is found to have anti-tumoral effects on the BE organoids, a new, less harsh, method of treatment could be used for pre-cancerous BE cells and EAC. EAC is often caught late, reducing the treatment options available. The American Cancer Society estimates that 21,500 people were diagnosed with esophageal cancer in the United States in 2023 and EAC is the 6th leading cause of cancer death in the world. Treatments that use iRF could improve the treatment options for esophageal cancer.

2023: Finding the

42nd Annual Summer Student
Research Program Symposium

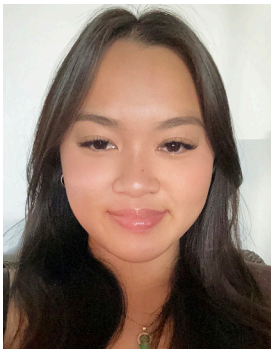
Highlighting our SSRP Alumni

Israel Fuentes

Kayla Jones

Ali Odeh

Amber Peake



Jenny Tran

Erika Zagni

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 small group and journal club discussions, supporting fellow interns as they negotiate research obsticles, 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.

2023: Finding the

42nd Annual Summer Student Research Program Symposium

National Institutes of Health (NIH) Scholars


Jasleen Bains


Julia Batthkuu


Alina Chen


Aaron Featherstone


Gabino Guzman


Aminah Jamal


Medha Madav


Kelly Ngo


Lilly Nusratty

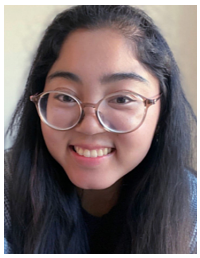

Ali Odeh


Lorena Parsaie


Amber Peake


Gael Perez


Xiomara Rodrigquez


Geomarie Ashley Saldaña


Jason Tesfa


Jordan Walton


Eirini Williams


Erika Zagni


Natalya Zuberi

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 school at institutes all over 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, 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.

2023: Findina the

42nd Annual Summer Student Research Program Symposium

California Institute for Regenerative Medicine (CIRM) Scholars

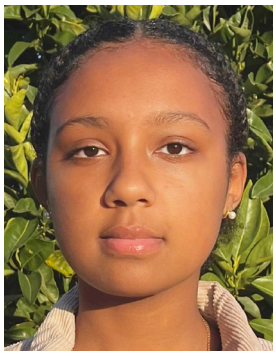
Margo Azzam

Samina Ginwalla

Samirah Isah

Irma Medoza Gomez

Bavana Pydipati



Phoeben Worku

This group of students was funded by the California Institute for Regenerative Medicine (CIRM)- Supporting Underrepresented STEM Adapting to Change: Summer Program to Accelerate Regenerative Medicine Knowledge: Sustain-A-SPARK. Their summer research project's focused primarily on stem / progenitor cell or translational research. In addition, they engaged in patient focused activities, maintained Pen Pal correspondence with a patient recovering from a bone marrow transplant throughout the summer, 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.

2023: Findina the

42nd Annual Summer Student
Research Program Symposium

Doris Duke Charitable Foundation (DDCF) Scholars


Daniel Chiarelli

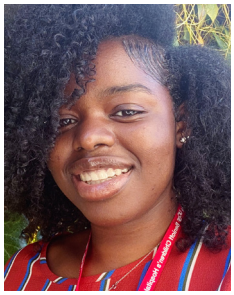

Kayla Chin


Israel Fuentes


Kayla Jones


Linda Ly


Mercy Niyi-Awolesi

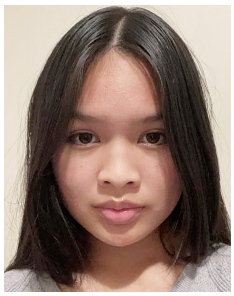

Precious Offu

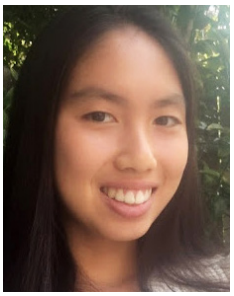

Jesus Ortiz del Toro


Maria Ramirez-Vicente


Zalyia Sharkey


Jenny Tran


Jennifer Tran


Michelle To

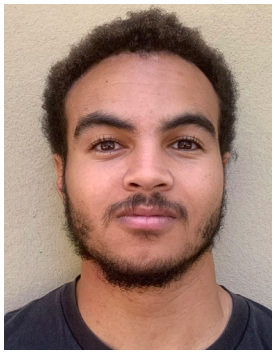
These students were funded by a grant from the Doris Duke Charitable Foundation, SUSTAIN grant, SSRP Supporting Underrepresented STEM Adapting to Change. Both high school and returning SSRP DDCF Scholars who are now undergraduate students are funded under this program. All students are interested in 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, created a detailed goal setting individual development plan (IDP), presented a brief 'flash talk' about their work to their peers, and 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.

2023: Findina the

42nd Annual Summer Student Research Program Symposium

Scholars Supported Independently or by the National Science Foundation

Eashani Ghosh



Ryan Nickens

Antonio Harris

These high school and undergraduate students were funded Independently or by the National Science Foundation. These students were selected from a competitive pool of applicants from all over the United States. Each student developed their own hypothesis driven project, carried out this project during the 9-week one-on-one mentored program, created a detailed goal setting individual development plan (IDP), presented a brief 'flash talk' about their work to their peers, and 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.

This Year's Mentors

Mentor	Department, Division	Location
Tariq Ahmad, MD	Pediatrics, Endocrinology	UCSF Benioff Children's Hospital Oakland
Sabina Ali, MD	Pediatrics, Gastroenterology	UCSF Benioff Children's Hospital Oakland
Anu Argawal, MD	Pediatrics, Hematology/Oncology	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
Peter Beernink, PhD	Pediatrics, Virology	MLK Research Building, UCSF
Angela Chang, MD	Pediatrics, Allergy & Immunology	UCSF Mission Bay
Jennifer Chen, MD	Hepatology	UCSF Parnassus
Felicia Chow, MD	Neurology	UCSF Mission Bay
Jan Christof, PhD	Cardiology	UCSF Mission Bay
Julia Chu, MD MPH	Pediatrics, Hematology/Oncology	UCSF Benioff Children's Hospital Oakland
Rose Citron, PhD	Molecular Cell Biology	UC Berkeley
Thuy Doan, MD PhD	Neurology	UCSF Mission Bay
Ayca Erkin-Cakmak, MD	Pediatrics, Endocrinology	UCSF Benioff Children's Hospital Oakland
Ellen Fung, PhD RD CCD	Pediatrics, Hematology	UCSF Benioff Children's Hospital Oakland
Stephanie Gaw, MD PhD	Reproductive Sciences	UCSF Mission Bay
Yvonne Goh, PhD	Pediatrics, Gastroenterology	UCSF
Mary Helen Barcellos-Hoff, PhD	Molecular Oncology	UCSF Parnassus
Hart Horneman, BS	Pediatrics, Hematology	MLK Research Building, UCSF
Sarah King, PhD	Pediatrics, Cardiology	MLK Research Building, UCSF
Ron Krauss, MD	Pediatrics, Cardiology	MLK Research Building, UCSF
Yu-Lin Kuang, PhD	Pediatrics	MLK Research Building, UCSF
Janet Lee, MD MPH MAS	Pediatrics, Endocrinology	UCSF Mission Bay
Dayna Long, MD	Pediatrics	Claremont Clinic
Kim Long, PhD	Postdoctoral Scholar, Psychiatry	UCSF Weill Institute for Neuroscience
Steve Mack, PhD	Pediatrics, Genetics	MLK Research Building, UCSF
Mari Manger, PhD	Deputy Director	International Zinc Nutrition Consultative Group
Aris Mattis, MD PhD	Pathology	UCSF Mission Bay
Christine McDonald, ScD	Pediatrics, Gastroenterology	MLK Research Building, UCSF
Marisa Medina, PhD	Pediatrics	MLK Research Building, UCSF

This Year's Mentors

Mentor	Department, Division	Location
Jennifer Michlitsch, MD	Pediatrics, Hematology/Oncology	UCSF Benioff Children's Hospital Oakland
Robert Mok, BS	Pediatrics	UCSF Benioff Children's Hospital Oakland
Jason Negata, MD	Pediatrics	UCSF Mission Bay
Henry Ocampo, MPH	Office of Diversity, Equity, Inclusion	UCSF Benioff Children's Hospital Oakland
Jenny Olson, MD FAAP	Pediatrics, Endocrinology	UCSF Benioff Children's Hospital Oakland
Jennifer Price, MD PhD	Hepatology & Liver Transplant	UCSF Parnassus
Yuanyuan Qin, PhD	Pediatrics	MLK Research Building, UCSF
Alison Reed, MD	Pediatrics, Endocrinology	UCSF Benioff Children's Hospital Oakland
Angela Rivers, MD PhD	Pediatrics, Hematology	UCSF Benioff Children's Hospital Oakland
Stephanie Sandoval-Pistorius, MD PhD	Postdoctoral Scholar, Neurology	UCSF Weill Institute for Neuroscience
Christine Schudel, MPH	Community Advocacy Primary Care	UCSF Benioff Children's Hospital Oakland
Prach Singh, DO FAAP	Pediatrics, Infectious Diseases	UCSF Benioff Children's Hospital Oakland
Joyce So, MD PhD	Genetics	UCSF Mission Bay
Matthew Stachler, MD PhD	Molecular Pathology	UCSF Parnassus
Mariamawit Tamerat, MD	Pediatrics	UCSF Benioff Children's Hospital Oakland
June Tester, MD MPH	Pediatrics, Endocrinology	UCSF Benioff Children's Hospital Oakland
Marsha Treadwell, PhD	Pediatrics, Psychology	UCSF Benioff Children's Hospital Oakland
Robert Ward Hagar, MD	Hematology/Oncology	UCSF Benioff Children's Hospital Oakland
Jonathan Witonsky, MD	Pediatrics, Allergy & Immunology	UCSF Benioff Children's Hospital Oakland
Shenjie Wu, PhD	Molecular Cell Biology	UC Berkeley
Yuanyuan Qin, PhD	Pediatrics	MLK Research Building, UCSF

Notes

Notes

Summer Students 2023

42nd Annual

Summer Student Research Program Symposium

Summer Student Research Program
Focusing on our diversity

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