USC WOMEN IN SCIENCE AND ENGINEERING

ANNUAL REPORT 2020-2021

wise

Contents

Executive Summary

The USC Women in Science and Engineering Program (WiSE) is USC's premiere diversity initiative. Founded in 2000 by an anonymous donation of $20 million, WiSE is an endowed initiative aimed at increasing the representation of women in tenured and tenure-track faculty positions in the sciences, engineering, and mathematics at USC.

Since the program's inception, WiSE has successfully helped to increase the number of women in these positions in the programs it represents -- the departments of engineering in the USC Viterbi School of Engineering (VSoE) and the departments of mathematics, biological sciences, earth sciences, physics and astronomy, and chemistry in the USC Dana and David Dornsife College of Letter, Arts and Sciences -- from 15 in 2000 to 76 in August 2020 (See Appendix 1). By targeting the recruitment and retention of new women faculty members and by establishing a suite of programs aimed specifically at creating an environment in which women at all stages of their careers may thrive, WiSE serves as a role model for successful diversity efforts at USC, as well as across the country and internationally.

During the 2020-2021 recruitment season, WiSE helped add **seven new women to the tenure-track faculty.** VSoE welcomes Assistant Professors **Audrey Olivier** (Civil and Environmental Engineering), **Swabha Swaymdipta** (Computer Science), and **Mengjie Yu** (Electrical and Computer Engineering). The Dornsife College welcomes Assistant Professors **Estefania Azevedo** (Biological Sciences), **Laura Melissa Guzman** (Biological Sciences), **Jazlyn Mooney** (Quantitative and Computational Biology), and **Kate White** (Chemistry).

WiSE continues to play an active role in helping to increase the representation of women faculty candidates by hosting meetings with department chairs and search committees to outline strategies for broadening the scope of searches for outstanding diversity candidates. WiSE leadership also actively meets with women faculty candidates during the interview process. During the 2020-2021 academic year, WiSE leadership participated in meetings with 39 formal candidates during their interviews (13 in Viterbi and 26 in Dornsife) (See Appendix 2). WiSE Support for Facilitating Diversity in Faculty Searches provided 1 grant to the department of Physics and Astronomy.

Additionally, WiSE successfully launched its Industry Partnership Program with its first two partners, Qualcomm and Cisco Systems. The program provided top-off fellowships to PhD students, alongside professional development programming and networking and recruitment opportunities.

Finally, WiSE expanded its childcare program to counterbalance the challenges of the global pandemic and added additional application deadlines for the major support and bridge funding programs.

WiSE Faculty Accomplishments

Current WiSE faculty members continue to distinguish themselves with campus-wide and national-level recognition for their research.

Viterbi School of Engineering

- **Ellis Meng** (Biomedical Engineering) was appointed as the inaugural holder of the Shelly and Ofer Nemirovsky Chair in Convergent Biosciences. She also received the Provost's Mentoring Award.
- **Burçin Becerik-Gerber** (Civil and Environmental Engineering) was appointed as Dean's Professor of Civil and Environmental Engineering. She also received an outstanding engineering merit award.
- **Leana Golubchik** (Computer Science) and Yolanda Gil (Computer Science) were elected AAAS 2020 Fellows.
- **Maryam Shanechi** (Electrical and Computer Engineering) was awarded the 2021 Curtis W. McGraw Research Award of the American Association of Engineering Education. She was also promoted to Associate Professor with tenure.
- **Maja Mataric** (Computer Science) was elected Association for Computing Machinery (ACM) Fellow.
- **Yan Liu** (Computer Science) was promoted to Full Professor.
- **Heather Culbertson** (Computer Science) received the NSF CAREER award. She also received the IEEE Technical Committee on Haptics Early Career Award.
- **Megan McCain** (Biomedical Engineering) was promoted to Associate Professor with tenure. She also received this year's Viterbi Junior Research Award.
- **Phebe Vayanos** (Industrial and Systems Engineering) received the NSF CAREER Award.
- **Urbashi Mitra** (Electrical and Computer Engineering) received the Viterbi Senior Research Award.
- **Eun Ji Chung** (Biomedical Engineering) received the 2021 Hanna Reisler Mentorship Award. She also received a 3M Non-Tenured Faculty Award, the Young Investigator Award -Oral Drug Delivery Focus Group- from the Controlled Release Society, a Young Investigator Award from the Chinese Association for Biomaterials and a Young Innovator in Cellular and Molecular Bioengineering from the Biomedical Engineering Society (BMES).
- **Cristina Zavaleta** (Biomedical Engineering) received the Faculty Mentoring Undergraduate Students Award.

- **Amy Childress** (Civil and Environmental Engineering) received the Faculty Mentoring Faculty, Postdoctoral Scholars, Medical Residents, and Fellows Award.

- **Lessa Grunenfelder** (Chemical Engineering and Materials Science) received the USC Stevens Technology Commercialization Award.

- **Maral Mousavi** (Biomedical Engineering) received a 3M Nontenured Faculty Award.

Dornsife College of Letters, Arts and Sciences

- **Greta Panova** (Mathematics) won the Institute of Mathematics and Informatics (IMI) Prize for 2020. The IMI Prize will be presented during the International Conference "Mathematics Days of in Sofia" in 2021.

- **Smaranda Marinescu** (Chemistry) was recognized by the 2021 ACS National Awards as the winner of the Harry Gray Award for Creative Work in Inorganic Chemistry by a Young Investigator.
- Sarah Feakins (Earth Sciences) was promoted to Full Professor.

- **Naomi Levine** (Biological Sciences, MEB) received an NSF CAREER award.

- The American Mathematical Society Notices celebrated the contributions of **Susan Friedlander** (Mathematics) in Mathematical Fluid Dynamics.

- **Liang Chen** (Quantitative and Computational Biology) was promoted to Full Professor.

- **Raffaella Ghittoni** (Biological Sciences) was promoted to Associate Professor (Teaching).

- **Gioia Polidori** (Biological Sciences) was promoted to Associate Professor (Teaching).

- **Jessica Parr** (Chemistry) was promoted to the rank of Professor (Teaching).

- **Hanna Reisler** (Chemistry) was appointed University Professor. She was also elected as a member of the American Academy of Arts and Sciences.

- **Anna Krylov** (Chemistry) was elected Fellow of the Royal Society of Chemistry.

- **Carly Kenkel** (Biological Sciences) was an inaugural recipient of the Dornsife Faculty Council Award for Distinguished Service in Diversity, Equity, and Inclusion.

- **Emily Liman** (Biological Sciences) received the USC Stevens Technology Commercialization Award.

WiSE Activities

Programming

During the 2020-2021 academic year, the WiSE Program hosted 90+ events and meetings. In order to further aid in the retention of women faculty and to encourage undergraduate and graduate students to pursue careers in the academe, WiSE holds various events each academic year.

WiSE planned and hosted the WiSE Alumni Lecture Series beginning in Spring 2021. Speakers in this series discussed their career paths & answered questions on a variety of career-related topics.

- **Dr. Christine Cheng** (USC PhD Alumna, Chemical Engineering), Lessons from All Two Minutes of my Career
- **Dr. Chelsea Appleget** (USC PhD Alumna, Aerospace Engineering), Aiming High: Pursuing a Career in Space
- **Dr. Rebecca Peer** (USC PhD Alumna, Civil and Environmental Engineering), A Peer's STEM Career: Finding Motivation, Mentorship, and Meaning

WiSE plans to continue this series with monthly talks throughout the 2021-2022 academic year.

WiSE also hosted the WiSE Leads – Pathways to Careers in Industry Series. It was initiated as part of the WiSE 20th Anniversary in conjunction with the development of the WiSE Corporate Partnership program. The main audience is graduate and undergraduate students in USC STEM departments. Speakers are invited to share their career paths, what helped them persevere, and why they might encourage students to continue in STEM.

- **Serpil Bayraktar** (Distinguished Engineer, Cisco), A Girl's Journey from Turkey to Silicon Valley
- **Susie Armstrong** (Senior Vice President, Engineering, Qualcomm)

WiSE Leads will also continue throughout the 2021-2022 academic year.

WiSE also celebrated its 20th Anniversary with a week-long offering of events consisting of an Origins of WiSE panel, yoga classes, alumni talks, and networking opportunities.

WiSE continues to provide professional development and networking opportunities for women. During the Fall 2020 and Spring 2021 semester, several WiSE teaching faculty members provided teaching workshops for the WiSE faculty community to help with the transition to teaching classes online during the 2020-2021 academic year.

During the 2020-2021 WiSE Undergraduate Research Experience, students had the opportunity to participate in 38 sessions, including:

Event	Date
Fall 2020	
Welcome Event	August 19, 2020
STEM Bytes Seminar	August 25, 2020
How to Apply to STEM PhD Programs	August 31, 2020
STEM Bytes Seminar	September 9, 2020
TED Talks	September 15, 2020
STEM Bytes Seminar	September 24, 2020
Academic Honors and Fellowships	September 28, 2020
STEM Bytes Seminar	September 30, 2020
STEM Bytes Seminar	October 6, 2020
TED Talks	October 15, 2020
STEM Bytes Seminar	October 21, 2020
New Faculty Guests	October 27, 2020
STEM Bytes Seminar	November 5, 2020
TED Talks	November 10, 2020
Spring 2021	
Welcome Social Event	January 21, 2021
STEM Bytes Seminar	January 26, 2021
Productivity Workshop	February 5, 2021
STEM Bytes Seminar	February 10, 2021
Personal Statement Workshop	February 18, 2021

Event	Date
STEM Bytes Seminar	February 23, 2021
Graduate Application Mentorship Program	March 3, 2021
STEM Bytes Seminar	March 10, 2021
GRIT Scale	March 16, 2021
STEM Bytes Seminar	March 25, 2021
Faculty Guests	March 30, 2021
STEM Bytes Seminar	April 9, 2021
Alumni Guests	April 13, 2021
STEM Bytes Seminar	April 20, 2021
End of Semester Social	April 28, 2021
Summer 2021	
Welcome and Social	June 7, 2021
STEM Bytes Seminar	June 14, 2021
WiSE Faculty Panel	June 21, 2021
STEM Bytes Seminar	June 28, 2021
USC Undergraduate Alumni Panel	July 12, 2021
STEM Bytes Seminar	July 19, 2021
Abstract Presentation and Discussion	July 26, 2021
End of Semester Social	August 2, 2021
Mini Symposium	August 6, 2021

Upon the conclusion of the WiSE Undergraduate Research Experience for WiSE Summer Researchers, WiSE held a virtual mini-conference (8/6/2021) where the participating undergraduate researchers presented short talks on their summer research to an audience comprised of faculty, staff, PhD students and postdoctoral researchers (See Appendix 5).

The WiSE Faculty Networking Group decided to meet twice a month, virtually. In April 2021, WiSE hosted USC Provost, Dr. Charles Zukoski. WiSE recognized all WiSE award recipients via its online social media channels and on its website.

WiSE Outreach

WiSE continues to issue regular newsletters. In addition, the Program launched an alumni newsletter to highlight WiSE alum and grow our alumni network.

WiSE also continues to support the USC Young Researchers Program (YRP) annually. YRP hosts a summer research experience devised and executed by USC graduate students for USC-area high school students in the sciences.

New and Expanded Awards

During this academic year, the WiSE Architects of Enduring Change Award was created to celebrate the 20th anniversary of the WiSE Program by honoring the group of forward-thinking women faculty who architected the program by choosing to invest in future faculty and students, thus affecting an institutional transformation at USC. The WiSE Architects of Enduring Change Award recognizes individuals at USC who have contributed to increasing representation of women in science and engineering by contributing to institutional change. The inaugural award was given to the following faculty members:

- **Jill McNitt-Gray** | *Biological Sciences*
- **Lorraine Turcotte** | *Biological Sciences*
- **Suzanne Edmands** | *Biological Sciences*
- **Hanna Reisler** | *Chemistry*
- **Anna Krylov** | *Chemistry*
- **Susan Montgomery** | *Mathematics*
- **Sarah Bottjer** | *Biological Sciences*
- **Emily Liman** | *Biological Sciences*
- **Maja Mataric** | *Computer Science*
- **Alice Parker** | *Ming Hsieh Electrical and Computer Engineering*
- **Kathy Shing** | *Mork Family Department of Chemical Engineering & Materials Science*

In collaboration with the Viterbi School and the Dornsife College, WiSE offered a temporary increase in its Child Care Subsidies Program for faculty in the 2020-2021 academic year to offset the costs of hiring additional in-home child care due to lack of availability of care outside the home. We also added additional application deadlines to our Major Support and Faculty Bridge Funding Programs.

Mentoring

In conjunction with WiSE's stated mission to build a supportive environment for women within the University, WiSE faculty mentor women at all levels – ranging from undergraduate to graduate students and postdoctoral scholars to faculty at all levels. Professor Jessica Parr (Chemistry) continued to coordinate the WiSE Undergraduate Experience, and she will stay in her role during the 2021-2022 academic year. Professor Raffaella Ghittoni joined as the Undergraduate Research Program Mentor beginning summer 2021, and will continue in her role during the 2021-2022 academic year.

The WiSE PhD Advisory Board continued its work on community building for PhD students within WiSE-eligible departments. The Board continued its formal mentorship program across WiSE-eligible departments and had 47 pairs of mentors/mentees participate. This past year the Board established its WiSE Liaisons program, in which they appointed liaisons in each department. These liaisons helped the board assess their department's needs, interfaced with department leadership, and organized attendance of WiSE events with the members of their respective departments. For the upcoming year the Board is focused on working with the liaison network to plan more events.

2021 Hanna Reisler Mentorship Award

The 2021 Hanna Reisler Mentorship Award, which recognizes individuals at USC who have advanced the careers of women in science and engineering through generous and committed professional mentorship, was awarded to **Eun Ji Chung,** Assistant Professor of Biomedical Engineering, to recognize her exceptional mentoring of students.

WiSE Students and Postdoctoral Scholars Achievements

Current and past WiSE students and postdoctoral scholars continue to be recognized for their research and accomplishments.

- **Goldie Roth** (Undergraduate in Chemical Engineering, Advisor Andrea Armani) was accepted into Stanford University's Chemical Engineering PhD program.

- **Hsin Pan** (Undergraduate in Electrical Engineering, Advisor Andrea Armani) was accepted into Princeton University's Electrical Engineering PhD program.

- **Celja Uebel** (Biological Sciences PhD student, Advisor Carolyn Phillips) secured a post-doc in Anne Villeneuve's lab at Stanford University starting January 2022.

- **Alicia Rogers** (Postdoc, Advisor Carolyn Phillips) will start her position as Assistant Professor at University of Texas, Arlington in January 2022. She was also awarded the American Cancer Society Post-doctoral fellowship (2021-2024).

- **Alysia Cox** (Postoc, Advisor Eun Ji Chung) received the 2021 PKD Foundation Postdoctoral Fellowship.

- **Deborah Chin** (Biomedical Engineering PhD Student, Advisor Eun Ji Chung) was named a 2020 ARCS Foundation Scholar, Los Angeles Chapter. She also received the North American Vascular Biology Organization's International Vascular Biology Meeting 2020 Poster Award (NAVBO-IVBM).

- **Madelynn Tung** (Undergraduate, Advisor Eun Ji Chung) received a 2021 USC Bridge Undergraduate Science Program Fellowship (BUGS).

- **Woori Lee** (Undergraduate, Advisor Eun Ji Chung) received a 2021 USC Bridge Undergraduate Science Program Fellowship (BUGS) and was accepted into the WiSE Undergraduate Research Experience.

- **Kairui Jiang** (Undergraduate, Advisor Eun Ji Chung) received a 2021 USC Bridge Undergraduate Science Program Fellowship (BUGS) and a USC Provost Undergraduate Research Fellowship.

- **Caroline Johnston** (Industrial and Systems Engineering PhD Student, Advisor Phebe Vayanos) received the NSF GRFP award.

- **Holland Elder** (Postdoc, Advisor Carly Kenkel) won the 2021 Wrigley Hagenah Endowed Postdoc Fellowship.

- **Sibelle O'Donnell** (Undergraduate, Advisor Carly Kenkel) was awarded a summer REU at Mote Marine Lab in Florida.

- **Shelby Barnes** (Undergraduate, Advisor Carly Kenkel) who graduated in Spring 2020 obtained a job as a lab tech in the Thrash lab here at USC.

- **Maiah Gaines-Richardson** (Undergraduate, Advisor Carly Kenkel) who graduated in December 2020 obtained a job as a lab tech at Stanford in the lab of Lauren O'Connell.

- **Karime Maamari** (Undergraduate, Advisor Vera Gluscevic) published a paper in Astrophysical Journal Letters in March and got a position at NASA Langley Research Center.

- **Dimple Sarnaaik** (Undergraduate, Advisor Vera Gluscevic) was accepted to USC Physics and Astronomy PhD program.

- **Allyson McGaughey** (Civil and Environmental Engineering PhD Student, Advisor Amy Childress) accepted Andlinger Center for Energy and the Environment Distinguished Postdoctoral Fellowship position at Princeton University.

- **Sophia Plata** (Civil and Environmental PhD Student, Advisor Amy Childress) accepted Visiting Assistant Professor and Postdoctoral Fellow in the Department of Engineering at Swarthmore College.

Advancement

WiSE continued work on its Corporate Partnership Program by collaborating with the Viterbi, Dornsife and University Corporate & Foundation Relations teams. We hosted a series of professional development programming during the 2020-2021 year for the WiSE Cisco and Qualcomm PhD fellows as part of our partnership with Cisco and Qualcomm. Topics included, Financial Concepts for Non-Business Professionals, Conflict Management, Communicating Science Online, Acing Your Non-Academic Job Interview, Presentation Design, and Negotiation, among others (See Appendix 4). Fellows also met with representatives from Qualcomm and Cisco throughout the academic year.

We also secured a partnership with The Aerospace Corporation for the 2021-2022 academic year. They provided funding for top-off fellowships to 9 students (undergraduate, masters and PhD), and each fellow interned at Aerospace during summer 2021. Aerospace has already agreed to continue their support for 2022-2023. Additionally, we secured a renewal for the program from Qualcomm for the 2021-2022 academic year. Northrop Grumman and Apple have also agreed to partner for the 2021-2022 academic year.

As part of our fundraising efforts, we received a donation from an individual donor to fund a new Undergraduate Professional Program during the 2021-2022 academic year. The goal of this program is to offer undergraduates professional development training and experiences to prepare them for successful careers in STEM fields. "WiSE Professional Fellows" submit an application describing their interests and objectives in participating in the program. Once accepted, they receive a small stipend of $500 per semester and commit to attending a variety of programming opportunities aimed especially at preparing a CV/resume, writing an effective cover letter, interview preparation, elevator pitches, negotiations, etc.

WiSE completed the third year of the WiSE Burg Communicating Science Program, finishing out the foundation grant from the Anton Burg Foundation. The WiSE Program was asked to submit a new proposal to expand the programming to undergraduate students. WiSE submitted a proposal in August 2021 for review. If awarded, we will continue the communication program for an additional three years for both graduate and undergraduate students.

WiSE Leadership

A critical aspect of the success of WiSE is the direct involvement of men and women faculty members, at all career levels and from both the USC Dornsife College and the Viterbi School of Engineering, in planning, evaluating, and guiding the Program's development. With the guidance of its diverse committees, WiSE programs have grown and evolved in response to changing needs. Continued evaluation of the success and utility of programs have helped to keep them relevant and effective.

WiSE Program Staff

Leana Golubchik, Stephen and Etta Varra Professor of Computer Science and Electrical and Computer Engineering in the Viterbi School of Engineering, serves as Director of the WiSE Program. Golubchik was appointed as Director in September 2010.

Mallory Redel, serves as the WiSE Program Manager and leads program development, operations, finance and committee coordination. She also oversees the Corporate Partnership Program. Mallory joined WiSE in November 2014. She holds a Bachelor of Science in Journalism from Middle Tennessee State University and a Master of Science in Social Entrepreneurship from the University of Southern California.

Marie Meneses joined the WiSE Program in November 2019 and serves as the WiSE Marketing Assistant. She manages the program's marketing, social media, and events. She holds a Bachelor of Arts in Advertising from Pepperdine University.

Jessica Parr, Professor of Chemistry (Teaching) in the Dornsife College of Letters, Arts and Sciences serves as the WiSE Undergraduate Program Coordinator. She has been leading the undergraduate program since Fall 2013.

Raffaella Ghittoni, Associate Professor of Biological Sciences (Teaching) in the Dornsife College of Letters, Arts and Sciences serves as the Undergraduate Research Program Mentor. She began this role in 2021.

WiSE Advisory Board

The WiSE Advisory Board met twice in the fall semester and twice in the spring semester during the 2020-2021 academic year (9/17/2020, 12/4/2020, 2/11/2021, and 4/22/2021) and continues to work with program administration to hone its recruitment and support of programs for maximum impact. The first meeting in the spring semester is joint with the USC Dornsife College and Viterbi School Committees.

During the 2020-2021 academic year, the Board devoted attention to different topics that included childcare, pandemic-related setbacks, COVID statements, and faculty recruitment. As always, the Board remains dedicated to mentorship, as it is key to all WiSE endeavors.

WiSE continues to advocate for ample, quality child care. While the pandemic created a host of new challenges for working parents, WiSE worked with the Viterbi School of Engineering and the Dornsife College of Letters, Arts and Sciences to find solutions. With the support of the Provost's Office, WiSE initiated a temporary expansion of its Child Care Assistance Program to support faculty while working from home with children. The program helped faculty carve out time for teaching, administrative and research responsibilities by providing funds to support in home child care. These programs were prioritized for junior faculty, as this cohort is the most vulnerable, but were available to others in need.

WiSE Leadership had several discussions with faculty members to assess the ways in which COVID has had a negative impact on career progress beyond childcare. The list of concerns was long and included a slowdown on lab renovations that junior faculty need to begin their research programs and downstream consequences on training students, difficulty recruiting for TA/RA-ships and motivating current students, canceled grants, slowdowns in core facilities, delayed orders of supplies and equipment as well as increased costs, extra barriers for research collaboration, the exorbitant demands of conversion of classes that involve projects to online substitutes, safety of remote research sites (research in the home), disruption of human subject studies, destruction of research animals and overall barriers to collecting research data.

WiSE leadership and the larger community provided ideas to mitigate the damage that these cumulative setbacks caused. There was widespread enthusiasm for support for grant writing and graphic design, both to free time for research and to improve the applications themselves. The Board supports the suggestion to devote additional funds for Supplemental Faculty Support for this purpose.

As above, the pandemic has chipped away at productivity in myriad ways, and the Board is particularly concerned about the impact on junior and midcareer faculty. Thus, the Board supports the suggestion of the inclusion of a COVID Statement that outlines the setbacks the pandemic caused to candidate statements for pre-tenure assessments and the dossiers that will be reviewed both internally and externally for promotion. The Board is pleased that this policy has been adopted by the university for faculty beyond the natural sciences and math, including disciplines such as the social sciences and humanities.

During the 2020-2021 recruitment season, WiSE helped add seven new women to the tenure-track faculty, bringing the total number to seventy-six. The new assistant professors are Estefania Azevedo (Neurobiology), Laura Guzman (Marine & Environmental Biology), Jazlyn Mooney (Quantitative & Computational Biology), and Kate White (Chemistry) in Dornsife, and Audrey Olivier (Civil & Environmental Engineering), Swabha Swayamdipta (Computer Science), and Mengjie Yu (Electrical and Computer Engineering) in Viterbi.

The Board devoted considerable effort this past year to discussing best practices for improving Diversity, Equity and Inclusion (DEI) outcomes for faculty searches and it values its ability to continue these discussions.

Finally, mentorship is key to the growth and strength of the WiSE community. Hanna Reisler continues to lead the faculty networking group. This academic year, the group met biweekly rather than monthly, scheduled during time slots to coordinate with the demands of fulltime childcare in the home. Senior WiSE faculty remain available to assist their junior colleagues.

The Board hopes that WiSE's many efforts will continue the acceleration of the rate at which women join the ranks of tenured and tenure-track faculty.

2020-2021 WiSE Advisory Board Members

Judith Hirsch (Chair)
Professor of Biological Sciences, Neurobiology
USC Dornsife College of Letters, Arts & Sciences

Linda Duguay
Associate Professor (Research) of Biological Sciences, MEB
USC Dornsife College of Letters, Arts & Sciences

David D'Argenio
Professor of Biomedical Engineering
USC Viterbi School of Engineering

Raffaella Ghittoni
Associate Professor (Teaching), Biological Sciences
USC Dornsife College of Letters, Arts & Sciences

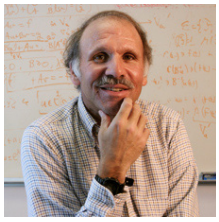
Leana Golubchik (Ex-officio, WiSE Director)
Professor of Computer Science and Electrical and Computer Engineering
USC Viterbi School of Engineering

Sandeep Gupta
Professor of Electrical and Computer Engineering-Systems
USC Viterbi School of Engineering

Julie Higle
Professor of Industrial & Systems Engineering
USC Viterbi School of Engineering

Susan Montgomery
Professor of Mathematics
USC Dornsife College of Letters, Arts & Sciences

Hanna Reisler
Professor of Chemistry
USC Dornsife College of Letters, Arts & Sciences



Gary Rosen
Gabilan Distinguished Professor of Science and Engineering
and Professor of Mathematics
USC Dornsife College of Letters, Arts & Sciences

Shang-Hua Teng
Professor of Computer Science
USC Viterbi School of Engineering

WiSE PhD Advisory Board

During the 2017-2018 academic year, WiSE established a PhD Advisory Board to further WiSE efforts in serving the PhD Community. The Board focuses on uncovering topics of interest to the STEM PhD Community at USC, and hosting events based on the findings.

2020-2021 WiSE PhD Advisory Board Members

Eun Ji Chung (Faculty Mentor)
Assistant Professor of Biomedical Engineering
USC Viterbi School of Engineering

Naomi Levine (Faculty Mentor)
Assistant Professor of Biological Sciences (MEB)
USC Dornsife College of Letters, Arts & Sciences

Nina Yang (Chair)
PhD Candidate, Marine and Environmental Biology
USC Dornsife College of Letters, Arts & Sciences

Megan Franke (Secretary, Culture Committee)
PhD Student, Computational Biology
USC Dornsife College of Letters, Arts & Sciences

Emily Reed (Mentorship Committee)
PhD Student, Electrical Engineering
USC Viterbi School of Engineering

Angineh Zohrabian (Mentorship Committee)
PhD Candidate, Civil and Environmental Engineering
USC Viterbi School of Engineering

Kylie Trettner (Culture Committee)
PhD Student, Chemical Engineering
USC Viterbi School of Engineering

Sarah Cooney (Culture Committee)
PhD Candidate Computer Science
USC Viterbi School of Engineering

Mallory Redel (Ex-officio)
WiSE Program Manager

USC Dornsife WiSE Committee

Committees composed of faculty in each school serve as advisors on grant-making by reviewing and evaluating the applications and making recommendations for funding.

2020-2021 WiSE Dornsife Committee Members

Jill McNitt-Gray (Chair)
Professor of Biological Sciences and Biomedical Engineering
USC Dornsife College of Letters, Arts & Sciences

James Boedicker
Associate Professor of Physics and Astronomy
USC Dornsife College of Letters, Arts & Sciences

Suzanne Edmands
Professor of Biological Sciences
USC Dornsife College of Letters, Arts & Sciences

Joshua West
Professor of Earth Sciences
USC Dornsife College of Letters, Arts & Science

A summary of the reviews conducted by the USC Dornsife Committee during the academic year follows:

Program	Deadline	Number of Applicants/ Nominations	Number of Awards
Undergraduate Research, Fall	May 16, 2020	31	8
Undergraduate Research, Spring	December 1, 2020	12	8
Graduate Merit	April 8, 2021	10	2
Graduate Top-Off	March 3, 2021	16	5 (13 offered)
Undergraduate Research, Summer	April 1, 2021	4	3

USC Viterbi WiSE Committee

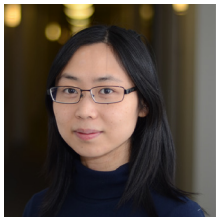
Committees composed of faculty in each school serve as advisors on grant-making by reviewing and evaluating the applications and making recommendations for funding.

2020-2021 WiSE Viterbi Committee Members

Malancha Gupta (Chair)
Gabilan Distinguished Professor of Science and Engineering
and Professor of Chemical Engineering & Materials Science
USC Viterbi School of Engineering

Felipe de Barros
Associate Professor of Civil & Environmental Engineering
USC Viterbi School of Engineering

Aleksandra Korolova
WiSE Gabilan Assistant Professor of Computer Science
USC Viterbi School of Engineering



Sze-Chuan Suen
WiSE Gabilan Assistant Professor of Industrial and Systems Engineering
USC Viterbi School of Engineering

A summary of the reviews conducted by the USC Viterbi Committee during the academic year follows:

Program	Deadline	Number of Applicants/ Nominations	Number of Awards
Undergraduate Research, Fall	May 16, 2020	8	8
Undergraduate Research, Spring	December 1, 2020	7	6
Graduate Merit	April 8, 2021	4	2
Graduate Top-Off	March 3, 2021	20	4 (13 offered)
Undergraduate Research, Summer	April 1, 2021	3	3

New Faculty

Estefania Azevedo has a PhD in Biochemistry from the Federal University of Rio de Janeiro, Brazil and did her postdoc studying neurobiology at the Rockefeller University working with Dr. Jeff Friedman. She will join USC in January 2022 as a Gabilan Assistant Professor of Biological Sciences in the Neurobiology section. Her lab uses multidisciplinary approaches to understand the molecular, cellular and circuit mechanisms that encode and integrate salient information and control innate behaviors, such as feeding. They are also interested in understanding circuits and molecules involved in stress, anxiety and eating disorders with the ultimate goal of finding new therapeutic targets to improve human health.

Laura Melissa Guzman will join the USC Department of Biological Sciences in the Marine and Environmental Biology section as a Gabilan Assistant Professor in January 2022. Melissa received her Ph.D. at the University of British Columbia and her M.Res. at Imperial college London in 2019 and 2013, respectively. Before joining USC, she was a Liber Ero Postdoctoral Fellow at Simon Fraser University, where she used large scale databases to determine where pollinators are experiencing the declines in North America. She also worked on identifying which driver (pesticide use, climate change or habitat loss) is causing the most decline of most species of pollinators. Her current research focuses on determining if and how statistical models can be applied to large biodiversity databases (which include museum records and community science) without yielding biased trends. She also applies these statistical models to determine how the distribution of pollinators and other insects has changed through time, where museum records provide lots of information.

Jazlyn Mooney will join USC as a Gabilan Assistant Professor in the Department of Quantitative and Computational Biology in January 2022. She is interested in using quantitative and computational biology as well as bioinformatics to analyze next-generation sequence data to study patterns of genetic diversity in humans and other species. Her work also focuses on determining how we can employ population genetics methods to better understand the evolutionary origins of disease and complex trait architecture in human populations.

Audrey Olivier holds a Diplôme d'Ingénieur from École Centrale de Nantes, France (2013) and a Ph.D. in Civil Engineering and Engineering Mechanics from Columbia University, New York (2017). She spent four years as a postdoctoral researcher at Columbia University and Johns Hopkins University before joining the Sonny Astani Department of Civil and Environmental Engineering at the University of Southern California as an Assistant Professor in the Fall 2021. Dr. Olivier's research seeks to leverage physics-based modeling and advanced probabilistic data analytics tools for the design and monitoring of civil systems. She has worked on applications in structural health monitoring and damage detection, data-driven materials modeling, or smart city applications such as optimization of EMS deployment. She has received awards from her Department at Columbia University for her doctoral work and performance as a Teaching Assistant; and in 2019, she was one of 32 young women researchers selected to attend the Rising Stars in Computational and Data Sciences workshop, held at the Oden Institute for Computational Engineering and Sciences at UT Austin.

Swabha Swayamdipta is a postdoctoral researcher at the Allen Institute for AI and soon-to-be a Gabilan Assistant Professor of Computer Science at the University of Southern California, beginning Fall 2022. Her research interests are in natural language processing, with a focus on promoting generalizability in models. To this end, her research involves studying data distributions to automatically uncover redundancies and undesirable biases in data, and using this knowledge to efficiently create higher quality datasets. She received her PhD from Carnegie Mellon University in 2019. Prior to this, she received a Master's degree from Columbia University and a Bachelor's degree from National Institute of Technology, Calicut in India.

Kate L. White is a Gabilian Assistant Professor of Chemistry at USC and the associate director of the Bridge Institute at USC. Kate is also the director of the Pancreatic Beta Cell Consortium (PBCC), an interdisciplinary community effort for mapping pancreatic beta cells. Kate's scientific training is in cell biology, structural biology, pharmacology, and chemical biology and she is interested in developing experimental methods for multiscale 3-dimensional visualization of single cells. She is also helping to develop integrative whole-cell modeling infrastructure to harmonize structural and mathematical representations of the cell across the scales of biology. She has been awarded several honors including speaking at the Burroughs Wellcome Fund Future of Biophysics Symposium and a recipient of the USC Women in Science Postdoctoral Merit Award.

Mengjie Yu will join USC as a Gabilan Assistant Professor in the Ming Hsieh Department of Electrical and Computer Engineering in January 2022. She received her Ph.D. degree in Electrical and Computer Engineering in 2018 from Cornell University and held research staff associate position in Applied Physics and Mathematics at Columbia University from 2015-2018. She is a postdoctoral fellow in the John A. Paulson School of Engineering and Applied Sciences at Harvard University since 2018. Her research group of "Nanoscale Nonlinear and Quantum Photonics Lab" will lead efforts in advancing the fundamental understanding of nonlinear sciences at nanoscale, as well as realize next-generation optoelectronic circuits for optical communication, computing, sensing, ranging and metrology. Her current research interests include nonlinear physics, optical frequency comb, mid-infrared spectroscopy, coherent photonic computing, and quantum photonics, enabled by advanced nanofabrication of low-loss photonic structures based on silicon, silicon nitride, and lithium niobate. She has published 34 peer-reviewed journal papers, with over 2100 citations and a h-index over 22. She has 48 conference papers and has given over 25 invited talks. Mengjie Yu is the 2020 Optica (formerly OSA) Ambassador. She was the winner of the 2016 Maiman Paper Competition and the 2016 Emil Wolf Paper Competition, and a finalist of the 2020 and 2021 Tingye Li Innovation Prize. She was the Caltech 2019 Young Investigator Lecturer. She was selected as the Rising Star Women in Engineering in the Asian Deans Forum 2019. Currently, she serves as chair of the OSA Integrated Photonics Technical Group.

WiSE Financial Awards

The WiSE Program has adhered closely to the original structure of funds allocation outlined by the 2000 WiSE Task Force: $500k for Recruitment/Retention; $100k for Undergraduate Research; $250k for PhD Student and Postdoctoral Support; and the remaining funds to support new additional programs. Actual distribution of funds may vary slightly each year depending on the return of investment income on the WiSE endowment and on the number of candidates who accept WiSE awards.

WiSE Gabilan Assistant Professorships

During the 2020-2021 academic year WiSE awarded WiSE Gabilan Assistant Professorships to four (two renewals) current faculty members and six incoming faculty members.

- **Emily Cooperdock** | *Earth Sciences* | *USC Dornsife*
- **Megan Feiser** | *Chemistry* | *USC Dornsife* **(renewal)**
- **Kate White** | *Chemistry* | *USC Dornsife*
- **Jazlyn Mooney** | *Quantitative and Computational Biology* | *USC Dornsife*
- **Estefania Azevedo** | *Biological Sciences (Neuro)* | *USC Dornsife*
- **Laura Melissa Guzman** | *Biological Sciences (MEB)* | *USC Dornsife*
- **Heather Culbertson** | *Computer Science* | *USC Viterbi* **(renewal)**
- **Phebe Vayanos** | *Industrial and Systems Engineering* | *USC Viterbi*
- **Swabha Swayamdipta** | *Computer Science* | *USC Viterbi*
- **Mengjie Yu** | *Electrical and Computer Engineering* | *USC Viterbi*

Formal Program Awards

Program	Number of Awards
Faculty Recruitment / Faculty Retention	19
Major Support for Current Faculty	3
WiSE Gabilan Assistant Professorship	10
WiSE Gabilan Distinguished Professorship	5
Lloyd Armstrong, Jr. Chair	1
Support for Facilitating Diversity in Faculty Searches	1
Faculty Bridge Funding	2
Supplemental Faculty Support	11
Merit Award for Excellence in Postdoctoral Research	1
Graduate Top-Off Awards	7
Merit Fellowships for Current PhD	6
Travel Grants	7
Undergraduate Research Grants	36
Child Care Subsidies (including temporary program expansion awards)	15
Support for Faculty Pregnancy, Childbirth, and Adoption	0
Support for PhD. and Postdoc Pregnancy, Childbirth, and Adoption	1
WiSE Leadership Award for Students and Postdoctoral Scholars	0
WiSE Architects for Enduring Change Award	11
Total Program Awards:	**136**

Appendix 1:
Current WiSE Faculty, Tenured and Tenure-Track (Including New Hires)

USC Dornsife College of Letters, Arts & Sciences

Life Sciences

Sarah Bottjer	Professor	Biological Sciences (Neuro)
Liang Chen	Professor	Quantitative and Computational Biology
Suzanne Edmands	Professor	Biological Sciences (MEB)
Carol Folt	Professor & President	Biological Sciences
Susan Forsburg	Professor	Biological Sciences (MCB)
Judith Hirsch	Professor	Biological Sciences (Neuro)
Emily Liman	Professor	Biological Sciences (Neuro)
Jill McNitt-Gray	Professor	Biological Sciences (HEB)
Lorraine Turcotte	Professor	Biological Sciences (HEB)
Irene Chiolo	Associate Professor	Biological Sciences (MCB)
Wiebke Ziebis	Associate Professor	Biological Sciences (MEB)
Estefania Azevedo	Assistant Professor	Biological Sciences (Neuro)
Carly Kenkel	Assistant Professor	Biological Sciences (MEB)
Laura Melissa Guzman	Assistant Professor	Biological Sciences (MEB)
Naomi Levine	Assistant Professor	Biological Sciences (MEB)
Jazlyn Mooney	Assistant Professor	Quantitative and Computational Biology
Carolyn Phillips	Assistant Professor	Biological Sciences (MCB)
Lindsey Schier	Assistant Professor	Biological Sciences (HEB)

Physical Sciences / Mathematics

Sarah Feakins	Professor	Earth Sciences
Susan Friedlander	Professor	Mathematics
Heidi Houston	Professor	Earth Sciences
Juhi Jang	Professor	Mathematics
Anna Krylov	Professor	Chemistry
Jia Grace Lu	Professor	Physics & Astronomy
Amber Miller	Professor & Dean	Physics & Astronomy
Susan Montgomery	Professor	Mathematics
Elena Pierpaoli	Professor	Physics & Astronomy
Hanna Reisler	Professor	Chemistry
Sami Assaf	Associate Professor	Mathematics
Rosa di Felice	Associate Professor	Physics & Astronomy
Smaranda Marinescu	Associate Professor	Chemistry
Greta Panova	Associate Professor	Mathematics
Emily Cooperdock	Assistant Professor	Earth Sciences
Megan Fieser	Assistant Professor	Chemistry
Vera Gluscevic	Assistant Professor	Physics & Astronomy
Kate White	Assistant Professor	Chemistry

USC Viterbi School of Engineering

Andrea Armani	Professor	Chemical Engineering and Materials Science
Burcin Becerik-Gerber	Professor	Civil and Environmental Engineering
Amy Childress	Professor	Civil and Environmental Engineering
Leana Golubchik	Professor	Computer Science
Malancha Gupta	Professor	Chemical Engineering & Materials Science
Julie Higle	Professor	Industrial and Systems Engineering
Andrea Hodge	Professor	Chemical Engineering and Materials Science
Eva Kanso	Professor	Aerospace and Mechanical Engineering
Yan Liu	Professor	Computer Science
Maja Matarić	Professor	Computer Science
Ellis Meng	Professor	Biomedical Engineering
Urbashi Mitra	Professor	Electrical and Computer Engineering
Mahta Moghaddam	Professor	Electrical and Computer Engineering
Alice Parker	Professor	Electrical and Computer Engineering
Michelle Povinelli	Professor	Electrical and Computer Engineering
Nora Ayanian	Associate Professor	Computer Science
Bistra Dilkina	Associate Professor	Computer Science
Stacey Finley	Associate Professor	Biomedical Engineering
Mercedeh Khajavikhan	Associate Professor	Electrical and Computer Engineering
Megan McCain	Associate Professor	Biomedical Engineering
Kelly Sanders	Associate Professor	Civil and Environmental Engineering
Katherine Shing	Associate Professor	Chemical Engineering & Materials Science
Victoria Stodden	Associate Professor	Industrial and Systems Engineering
Ananya Renuka Balakrishna	Assistant Professor	Aerospace and Mechanical Engineering
Heather Culbertson	Assistant Professor	Computer Science
Eun Ji Chung	Assistant Professor	Biomedical Engineering
Aleksandra Korolova	Assistant Professor	Computer Science
Maral Mousavi	Assistant Professor	Electrical Engineering
Audrey Olivier	Assistant Professor	Civil and Environmental Engineering
Feifei Qian	Assistant Professor	Electrical and Computer Engineering
Maryam Shanechi	Assistant Professor	Electrical and Computer Engineering
Shaama Sharada	Assistant Professor	Chemical Engineering & Materials Science
Sze-Chuan Suen	Assistant Professor	Industrial and Systems Engineering
Swabha Swayamdipta	Assistant Professor	Computer Science
Jennifer Treweek	Assistant Professor	Biomedical Engineering
Alejandra Uranga	Assistant Professor	Aerospace and Mechanical Engineering
Phebe Vayanos	Assistant Professor	Industrial and Systems Engineering
Renyuan Xu	Assistant Professor	Industrial and Systems Engineering
Mengjie Yu	Assistant Professor	Electrical and Computer Engineering
Cristina Zavaleta	Assistant Professor	Biomedical Engineering

Appendix 2:
Faculty Candidates Interviewed Via Zoom

As in previous years, WiSE leadership offered to meet with faculty candidates, both to communicate information about the WiSE Program and resources and to provide opportunities for candidates to ask questions about USC and work-family issues that they might not feel comfortable discussing as part of their formal interview process. Departments continued to take advantage of this offer and senior WiSE faculty met with 39 faculty candidates over the course of 2020-2021. The list of candidates is below:

Kate White	Chemistry	February 9, 2021
Tanvi Karwal	Physics and Astronomy	February 10, 2021
Victoria Barber	Chemistry	February 11, 2021
Jia Liu	Physics and Astronomy	February 17, 2021
Kris Pardo	Physics and Astronomy	February 24, 2021
Mathew Madhavacheril Leilani	Physics and Astronomy	February 25, 2021
Gilpin	Computer Science	March 2, 2021
Katie Gostic	Quantitative and Computational Biology	March 4, 2021
Ferah Munshi	Physics and Astronomy	March 5, 2021
Kirstie Cummings	Biological Sciences (Neuro)	March 5, 2021
Mariya Toneva	Computer Science	March 8, 2021
Sanghamitra Dutta	Computer Science	March 8, 2021
Saiph Savage	Computer Science	March 8, 2021
Jazlyn Mooney	Quantitative and Computational Biology	March 9, 2021
Helen Vuong	Biological Sciences (Neuro)	March 9, 2021
Priyanka Verma	Biological Sciences (MCB)	March 9, 2021
Vered Shwartz	Computer Science	March 10, 2021
Sarah Swygert	Biological Sciences (MCB)	March 10, 2021
Meg Younger	Biological Sciences (Neuro)	March 11, 2021
Swabha Swayamdipta	Computer Science	March 11, 2021
Vanessa Jonsson	Quantitative and Computational Biology	March 11, 2021
Christina 'Tina' Kim	Biological Sciences (Neuro)	March 15, 2021
May Elsherif	Computer Science	March 15, 2021
Amy Zhang	Computer Science	March 15, 2021
Jamana Alhaj Abed	Biological Sciences (MCB)	March 16, 2021
Meng Wang	Quantitative and Computational Biology	March 16, 2021
Dhanya Sridhar	Computer Science	March 16, 2021
Michelle Brown	Biological Sciences (HEB)	March 16, 2021
Amy Pavel	Computer Science	March 18, 2021
Estefania Pereira Cardoso Azevedo	Biological Sciences (HEB)	March 23, 2021

Sarah Ackerman	Biological Sciences (Neuro)	March 25, 2021
Jinye Dai	Biological Sciences (Neuro)	March 26, 2021
Tomomi Karigo	Biological Sciences (Neuro)	April 1, 2021
Mengjie Yu	Electrical and Computer Engineering-EP	April 13, 2021
Gaia Stucky de Quay	Earth Sciences	April 13, 2021
Angela Rigden	Earth Sciences	April 21, 2021
Yoshi Maezumi	Earth Sciences	May 4, 2021
Omolola (Lola) Eniola-Adefeso	Biomedical Engineering - Chair Search	May 5, 2021
Kristin Swanson	Biomedical Engineering - Chair Search	May 11, 2021

Appendix 3:
Samples of WiSE Events Flyers

USC WOMEN IN SCIENCE & ENGINEERING

WiSE UNDERGRADUATE PROGRAMMING

SPRING 2021

DATE	EVENT	TIME	LOCATION
Thursday, January 21	**Welcome and Social Event**	12 - 1 pm	Zoom
Tuesday, January 26	**STEM Bytes Seminar**	12 - 1 pm	Zoom
Friday, February 5	**Productivity Workshop**	12 - 1 pm	Zoom
Wednesday, February 10	**STEM Bytes Seminar**	12 - 1 pm	Zoom
Thursday, February 18	**Personal Statement Workshop**	12 - 1 pm	Zoom
Tuesday, February 23	**STEM Bytes Seminar**	12 - 1 pm	Zoom
Wednesday, March 3	**Graduate Application Mentorship Program**	12 - 1 pm	Zoom
Wednesday, March 10	**STEM Bytes Seminar**	12 - 1 pm	Zoom
Tuesday, March 16	**Grit Scale**	12 - 1 pm	Zoom
Thursday, March 25	**STEM Bytes Seminar**	12 - 1 pm	Zoom
Tuesday, March 30	**Faculty Guests**	12 - 1 pm	Zoom
Friday, April 9	**STEM Bytes Seminar**	12 - 1 pm	Zoom
Tuesday, April 13	**Alumni Guests**	12 - 1 pm	Zoom
Tuesday, April 20	**STEM Bytes Seminar**	12 - 1 pm	Zoom
Wednesday, April 28	**End of Semester Social**	12 - 1 pm	Zoom

This programming is for the Fellows and Researchers in the WiSE REU Program for Spring 2021.

We open these events to all USC students. If you are interested in participating, please contact WiSE marketing assistant, Marie Meneses, at marieste@usc.edu.

You may register for STEM Bytes in advance by clicking the links or visiting our website.

FOLLOW US

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Email:
wiseprog@usc.edu

Website:
wise.usc.edu

USC University of Southern California

USC WOMEN IN SCIENCE & ENGINEERING

STEM BYTES SEMINARS

Fall 2020 | 12:00 - 1:00 pm PT | Zoom | Open to all USC students

Tuesday, August 25

Lernik Asserian

Prohorov Metric-Based Nonparametric Estimation of Random Parameters in Abstract Parabolic Systems with Application to the Transdermal Transport of Alcohol

Abstract: We obtain numerical results by applying a nonparametric estimation approach to a problem involving an alcohol biosensor, wherein we estimate the probability distribution of the parameters of a random parabolic PDE. We apply our algorithm to simulated data as well as actual human subject data from the alcohol biosensor and observe the results under different model complexities.

Bio: Lernik Asserian is a Ph.D. Candidate in Applied Mathematics at University of Southern California (USC), working on her research under the supervision of Professor Gary Rosen. She is currently a Teaching Assistant at USC. She received the USC Department of Mathematics Theodore Edward Harris Graduate Teaching Prize in Spring 2019. She got her Bachelor of Science in Applied Mathematics from University of California, Los Angeles (UCLA). Lernik spent 2.5 years as a student researcher at NASA's Jet Propulsion Laboratory (JPL) SIRI Internship Program, California Institute of Technology (Caltech) MURF Internship Program, and JPL Year-Round Internship Program, working on various projects in Earth Sciences.

Sanjana Kerketta

Transient plasma and some of its commercial applications

Abstract: I will be speaking about Transient plasma as a novel research area with potential applications in plasma medicine, agriculture, engine ignition and combustion control.

Bio: Since 2015, Dr. Sanjana Kerketta has worked as a Research Assistant to Dr. Martin Gundersen who is the Director of the Pulsed Power Research Group at USC. She has been with the Department of Electrical Engineering- Electrophysics, where she is involved in projects related to pulsed power technology and its applications for the Ph.D. degree in electrical engineering. In particular, Sanjana has concentrated her studies on the mechanism of pulsed power technology for engine ignition and combustion control.

Wednesday, September 9

Amanda Godbold

Coral reefs and mass extinctions

Abstract: Coral reefs are truly fascinating, having survived four mass extinction events throughout earth history these ecosystems are confronted with yet another devastating fight for survival. In this talk I will explore how paleontology can be used to better understand the modern coral reef crisis.

Bio: Amanda Godbold is a fourth year Ph.D. student in the Earth Sciences Department at USC. She completed her undergraduate and master's degree at the University of Calgary located in Canada. During her undergraduate degree, Amanda met Professor Charles Henderson who encouraged her to explore her curiosity in paleontology and later became her academic advisor for a master's degree. She feels very fortunate to have had two great advisors (Professors Charles Henderson and David Bottjer) that allowed her to develop and pursue her own passions in research as well as support her on her journey to discover who she is as a scientist. Her research focuses on the environmental and ecological controls on community membership within coral reefs. Ultimately, she is interested in identifying the parameters that make communities more resilient.

Annastasia Haynie

Shock Breakout in Dense Circumstellar Material

Abstract: Shock breakout refers to the initial flash of emission in a core collapse supernova, yet is generally too hot and short lived to observe. Luckily, in the presence of circumstellar material, this signal becomes elongated, allowing us to observe it and providing insight to the properties of the progenitor star.

Bio: As a Ph.D. student at USC, Anna Haynie conducts her research at Carnegie Observatories in Pasadena on astrophysical explosions and is a member of Vera Gluscevic's CosmoLab group at USC, which focuses on Cosmic Microwave Background cosmology. Anna is the Vice President of the Graduate Associate for Students in Physics and is passionate about science outreach, communication, and accessibility.

USC WOMEN IN SCIENCE & ENGINEERING PRESENTS

STEM BYTES SEMINARS

Spring 2021 | 12:00 - 1:00 pm PT | Zoom | Open to the USC community

Tuesday, February 23

Katie Sayre

Growing Older in the Bush: what modern hunter-gatherers can teach us about human aging

Abstract: We often associate growing older with declines in physical and mental health—but most of what we know about human aging comes from work with sedentary industrialized populations, like the USA. In this talk, I will discuss what we can learn about human aging by working with more physically active subsistence-level populations.

Bio: Katie Sayre is a fourth year PhD student in the Integrative and Evolutionary Biology (IEB) graduate program at USC. Katie has a BA from the University of Texas at Austin (2013) and an MA from the University of Arizona (2017). At USC, Katie works with Dr. Dave Raichlen in the Evolutionary Biology of Exercise lab. Katie's research uses an evolutionary medicine perspective to explore how patterns of physical activity impact how we grow older.

Zachary Dunn

T Cells Engineered to Eradicate Cancer

Abstract: T cells are essential to the immune system, protecting the body from foreign substances and cancerous cells. In malignant disease, cells have developed mechanisms to evade natural defenses. By manipulating and harnessing the power of T cells, researchers have revolutionized the treatment of certain cancers using adoptive T cell therapy. It is our goal to create and modify adoptive T cell therapies to expand the proportion of patients that benefit from these exciting treatments. I will discuss T cell anticancer immunity, current adoptive T cell therapies, and future directions of the field.

Bio: After graduating summa cum laude from the University of California Riverside, Zachary entered the chemical engineering PhD program at USC as a USC Rose Hills Foundation Fellow. In the Center for Immunoengineering lab, Zachary develops novel therapies that activate the immune system to fight cancer. Outside of the lab, Zachary is a USC Office of Health Promotions Strategy Community Health Organizer, a member of the USC Men's Club Soccer team, and an avid reader.

Wednesday, March 10

Emily Aguirre

Genotype-by-Environment Effects on the Epibiome of the Endangered Staghorn Coral, Acropora Cervicornis

Abstract: Recent microbiome studies across taxa have revealed the influence of host genotype on microbial recruitment and maintenance, yet studies exploring host-specific associates in Scleractinian corals are scant. Here, we investigated (1) host-specific differences in Acropora cervicornis (Staghorn coral) epibiomes from a common garden nursery and (2) environmentally-induced epibiome shifts, one year after transplantation.

Bio: Emily Aguirre is a Los Angeles native and first-generation, Central American graduate. She holds an A.A.S in Chemical Technology, a B.S. in Microbiology and is currently an NSF fellow, working on her Ph.D. Emily's research interests are driven by her broad interest in host-microbe interactions. Currently, she is investigating nutrient exchange between marine bacteria, symbiotic algae and corals. When not engaged in research, Emily is committed to mentoring students on a similar track and helping them navigate through college and beyond. Parallel to mentoring, Emily also enjoys communicating science to the public, and has published several pop-sci articles for the Daily Chela, and is currently serving as an organizing committee member for ComSciCon-LA 2021.

Michael Kruger

The Challenges and Potential Benefits of Electric Aircraft

Abstract: Commercial aviation has been growing at an enormous rate over the past decades, and this growth is expected to continue, along with the continued use of hydrocarbon fuels to power the aircraft. Electric propulsion might have the potential to significantly improve the efficiency of aircraft, offsetting some of the adverse environmental effects and reducing the cost of flying, making it more accessible to all.

Bio: Michael Kruger is a PhD student doing research in the field of conceptual aircraft design. Michael believes that many of today's most important problems can be solved through technology, which in turn is built off of fundamental science and research. To this end, Michael is investigating novel technologies to improve the efficiency of commercial transport aircraft with the hope of reducing the adverse environmental effects of aviation and making the wonder of flight more accessible to the world.

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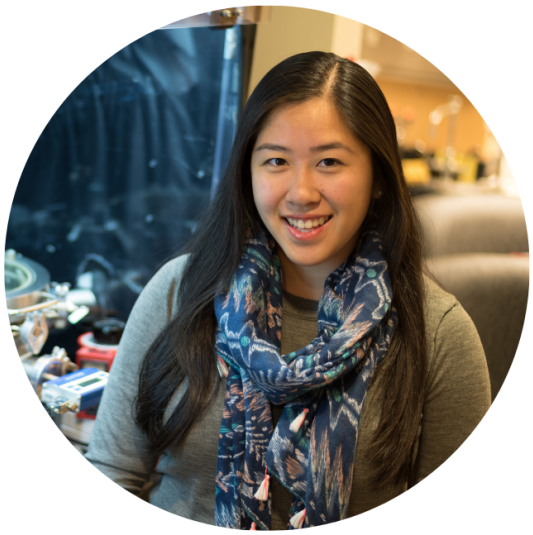
WISE ALUMNI LECTURE SERIES



CHRISTINE CHENG

Thursday, March 4
12:00 - 1:00 pm PST
Zoom Webinar

Christine will discuss her career path and what has helped her persevere over time.

Christine Cheng is a systems engineer at Northrop Grumman, where she manages an internal innovation program from Baltimore, MD. She is a member of professional societies including Society of Women Engineers, American Institute of Chemical Engineers, and Phi Kappa Phi Honor Society. Prior to joining NG, Christine completed her Ph.D. in chemical engineering at the University of Southern California, where she researched polymer materials and coating processes in the Gupta Polymers Lab. During her time at USC, Christine was involved in student orgs including the Materials Research Society, and she is the recipient of the ARCS Foundation Scholar Award and the AMI Innovation in Engineering Doctoral Fellowship, amongst other awards. Her research has been published in journals including Advanced Materials Interfaces and the Journal of the American Chemical Society. Outside of her academic and professional pursuits, Christine also enjoys distance running, reading, and making use of her recently purchased Dutch oven.

Register Here:
tinyurl.com/WiSEChristineCheng

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WISE ALUMNI LECTURE SERIES

CHELSEA APPLEGET

Tuesday, March 9
3:00 - 4:00 pm PST
Zoom Webinar

Aiming High: Pursuing a Career in Space

Chelsea Appleget received her B.S. from Auburn University in 2015 where she studied Aerospace Engineering and Applied Mathematics. After her undergraduate studies, she began her doctoral work at the University of Southern California in Aerospace Engineering, working with Professor Andrea Hodge to investigate the relationship between mechanical and optical behavior in nano-multilayered coatings. As part of this work, Chelsea was awarded the four-year NASA Space Technology Research Fellowship (NSTRF) to fund her graduate studies and research. This work was also carried out during research visits to the NASA Glenn Research Center and the Karlsruhe Institute of Technology (KIT). After receiving her PhD in 2020, Chelsea began as a Senior Member of the Technical Staff at The Aerospace Corporation in El Segundo, CA where she focuses on conducting basic and applied research in nanostructured thin films and optical materials for space applications.

Register Here:
tinyurl.com/WiSEChelseaAppleget

Appendix 4:
WiSE Corporate Partnership Programming Summaries

FALL 2020: Professional Development Programming

Writing a Proposal

This event offered an informal discussion of graduate and postdoc fellowships. What makes a good grant proposal? In so few pages, how can you successfully tell the reviewers about yourself and your research plan? How is proposal writing different from manuscript writing? Students learned about these questions and more from USC Dornsife Grant Consultant, Dr. Heidi Smith Parker.

Financial Concepts for Non-Business Professionals

This workshop was led by USC Accounting Professor, Zivia Sweeney. She covered the basics of the four financial statements, as well as managerial accounting principles to provide students with a basic financial foundation.

Conflict Management Workshop

Conflict happens, but, luckily, conflict management is a skill that can be developed. By learning to adroitly address organizational and interpersonal conflict, one can, over time, improve team dynamics and strengthen your professional standing. An important first step is to recognize the warning signs of conflict and to understand one's personal conflict style. This workshop explored different approaches to handling conflict, typical conflict triggers, and communication techniques that can be used to deescalate conflict and to promote discourse. The workshop was led by USC Ombudsperson, Dr. Katherine Greenwood.

Communicating Science Online

During these unprecedented times, it is critical that we be able to communicate clearly and effectively through the new online platforms available to us. This workshop provided participants a new set of skills to make their online public speaking events come alive with energy and interest. The format was similar to a "master class" where selected individuals offered five minutes of a presentation to the attending group, followed by an interactive conversation about tactics to improve. This included a discussion of the similarities and differences between online and in person communication as well as the various technical possibilities available on the Zoom platform. The workshop was led by Nancy Houfek who was Head of Voice and Speech for the Tony Award winning American Repertory Theater at Harvard from 1997 to 2014, teaching vocal production, coaching the professional acting company, and administering the M.F.A. program in voice training pedagogy.

Acing Your Non-Academic Job Interview
In this hands on workshop, participants learned how to ace the ever-important interview topic of, "Tell me about yourself." Each participant left with the confidence and skills to effectively answer this question and more. This workshop was led by Dr. Glenn Fox from the USC Marshall School of Business. Glenn is at the forefront of research on gratitude and human performance. Glenn teaches "The Science of Peak Performance", leads trainings with leaders and groups, and conducts research on mindset and physiology.

Effective Communication by Adapting Your Style
Learning to effectively communicate your work and planned work requires a lot of practice via trial and error. In this conversation, Professor Chugg (from USC's Electrical & Computer Engineering Department) summarized what he has learned, the hard way, about communicating technical ideas to diverse audiences.

SPRING 2021: Professional Development Programming

Dr. Angelique Johnson (MEMStim LLC) Fireside Chat
Ever wanted to find out what it is like to start and build a company as a graduate student researcher and then a freshly minted Ph.D.? Do you wonder about how to assess your inventions and determine if the ideas are worth pursuing? How about entering the highly competitive sector, such as the medical device industry, and building a successful startup? This wide-ranging discussion with Dr. Angelique Johnson, a serial entrepreneur who has founded two startup companies and mentored many founders all over the world, answered those questions and more. Dr. Johnson introduced her companies and fielded questions from the audience.

Presentation Design
This informal discussion about the wide-ranging aspects of designing presentations was led by Emily Hazlett, Director of Brand Marketing at Genexa. She has extensive experience in marketing strategy, business development, communications, and innovative content strategy. She has perfected the art of communicating creatively via presentation software (PowerPoint, Prezi, Keynote, etc.) through creating pitch decks for startups and other businesses.

Crucial Conversations
This workshop built on concepts discussed in Fall semester's Conflict Management workshop. It offered a deep dive into the widely taught and practiced communication strategy training, based on the New York Times Best-Selling Book Crucial Conversations. Students learned strategies to foster open dialogue at all levels of an organization. The workshop was facilitated by USC Ombud, Dr. Kathie Greenwood.

Negotiation Workshop
Led by USC Marshall School of Business Professor Michael Coombs, this workshop covered strategies and recommendations for preparation for negotiations surrounding job offers and salary.

The Essentials: An Online Science Communication Experience (The Alda Method)

This workshop offered and intensive introduction to effective and meaningful science communication. It combined improvisational theater exercises with message-design strategies to help others incorporate their experiences to engage with the presented research. Participants explored strategies to help them build trust and connect with others in conversations and presentations about their research. This workshop was led by Elizabeth Bojsza, assistant professor of practice and the graduate program coordinator at the Alda Center, and Dr. Radha Ganesan, an assistant professor of practice and an Alda-certified instructor.

Spring 2021: WiSE Alumni Lecture Series

Speakers in this series discuss their career paths & answer questions on a variety of topics.

WiSE Alumni Lecture Series - Dr. Christine Cheng

Lessons from All Two Minutes of my Career
Christine is a systems engineer at Northrop Grumman, where she manages an internal innovation program from Baltimore, MD. She is a member of professional societies including Society of Women Engineers, American Institute of Chemical Engineers, and Phi Kappa Phi Honor Society. Prior to joining NG, Christine completed her Ph.D. in Chemical Engineering at USC, where she researched polymer materials and coating processes in the Gupta Polymers Lab. During her time at USC, Christine was involved in student orgs including the Materials Research Society, and she is the recipient of the ARCS Foundation Scholar Award and the AMI Innovation in Engineering Doctoral Fellowship, amongst other awards. Her research has been published in journals including Advanced Materials Interfaces and the Journal of the American Chemical Society.

WiSE Alumni Lecture Series – Dr. Chelsea Appleget

Aiming High: Pursuing a Career in Space
Chelsea Appleget received her B.S. from Auburn University in 2015 where she studied Aerospace Engineering and Applied Mathematics. After her undergraduate studies, she began her doctoral work at the University of Southern California in Aerospace Engineering, working with Professor Andrea Hodge to investigate the relationship between mechanical and optical behavior in nano-multilayered coatings. As part of this work, Chelsea was awarded the four-year NASA Space Technology Research Fellowship (NSTRF) to fund her graduate studies and research. This work was also carried out during research visits to the NASA Glenn Research Center and the Karlsruhe Institute of Technology (KIT). After receiving her PhD in 2020, Chelsea began as a Senior Member of the Technical Staff at The Aerospace Corporation in El Segundo, CA where she focuses on conducting basic and applied research in nanostructured thin films and optical materials for space applications.

WiSE Alumni Lecture Series – Dr. Rebecca Peer

A Peer's STEM Career: Finding Motivation, Mentorship, and Meaning

Dr. Rebecca Peer is a Lecturer in Civil Systems Engineering in the department of Civil and Natural Resources Engineering at the University of Canterbury in New Zealand. She started her faculty role in June 2020, after completing a postdoc in energy systems modelling at the Carnegie Institution for Science at Stanford University. Rebecca received both her MS and PhD in Environmental Engineering from USC. Throughout her graduate studies she was an active member of WiSE and served as the president of the inaugural WiSE PhD Advisory Board.

Spring 2021: WiSE Leads – Pathways to Careers in Industry Series

The WiSE Leads – Pathways to Careers in Industry series was initiated as part of the WiSE 20th Anniversary in conjunction with the development of the WiSE-corporate partnership program. The main audience is graduate and undergraduate students in USC STEM departments. Speakers are invited to share their career paths, what helped them persevere, and why they might encourage students to continue in STEM.

Serpil Bayraktar (Cisco) WiSE Leads – Pathways to Careers in Industry Series

A Girl's Journey from Turkey to Silicon Valley

Serpil Bayraktar is a Distinguished Engineer in Cisco's Cloud Security group responsible for leading teams delivering Secure Access Service Edge (SASE) services. She is also the founder of Cisco's Women in Technology program and the Advisor to Cisco's Women in Science and Engineering employee resource organization. Serpil has been a network engineer for more than 30 years and holds a B.S. in EE from Istanbul Technical University as well as an MBA from Eastern Michigan University.

Susie Armstrong (Qualcomm) WiSE Leads – Pathways to Careers in Industry Series

Susan M. Armstrong started at Qualcomm working on Globalstar and then early CDMA base station projects. She was a pioneer in bringing internet protocols to the cellular industry, resulting in the first web surfing on a cellular phone in 1997, and Qualcomm's commercialization of packet data in 1998. Since then she has held various leadership positions, first responsible for the development and commercialization of the all of the software that drives Qualcomm's chipsets, and then as the head of worldwide Customer Engineering. In addition to her work on Qualcomm's inventions and new technologies, she has worked extensively with base station makers, carriers, phone and device makers in the US, Asia and Europe to bring those technologies to market.

In 2015, Armstrong has joined Qualcomm's Government Affairs group, where she brings an engineering and product background the Government Affairs work in worldwide public policy, including intellectual property protection, cyber security, STEM and STEM diversity.

Appendix 5:
WiSE Undergraduate Researcher Mini Symposium

WiSE Undergraduate Summer Research Mini Symposium

Friday, August 6, 2021
9:30 am - 11:30 am PDT

Schedule

9:30 – 9:35	Introductory Remarks
9:35 – 9:50	Dania Duran Professor Andrea Armani, Raymond Yu
9:50 – 10:05	Cassondra Giffin Professor Travis Williams, PhD Candidate Carlos Navarro
10:05 – 10:20	Isha Sanghvi Professor Dion Dickman, PhD Candidate Nancy Tran
10:20 – 10:30	**Break**
10:30 – 10:45	Kaylee Tseng Professor Kate white, PhD Candidate Wen Lin
10:45 – 11:00	Sabrina Sy Professor Michael Khoo, PhD Mentor Wanwara "Toey" Thuptimdang
11:00 – 11:15	Woori Lee Professor Eun Ji Chung, PhD Candidate Deborah Chin Professor Paul Bogdan
11:15 – 11:30	Closing Remarks

Grating Coupler Design for Biophotonics

Dania Duran, Raymond Yu, Andrea Armani

In a joint collaboration between the Armani and Sideris lab, our group is responsible for developing a photonics testing system to measure the coupling efficiency of fabricated silicon photonics sensors. These photonics chips are intended for biosensing, such as wearable devices and implantable sensors, which is imperative to developing low-cost and minimally invasive systems for detecting disease and maintaining human health. To test the optical efficiency of the chips, a grating coupler system developed by the Armani lab will be implemented.

The grating coupling method when a vertical optical fiber is placed above a diffraction grating structure, in which light is coupled through the fiber and diffracted into the direction of the waveguide. Considering the incredible size difference between the fiber and waveguide (about 3+ orders of magnitude), this interaction significantly overcomes the challenge of coupling light into a waveguide as it reduces the transmission loss between the cleaved bare fiber to the waveguide and provides a more flexible method of testing as the fiber can be placed anywhere on the chip.

To create the grating coupler testing setup, our group first used Lumerical to hypothesize the incident angle of the fiber with a given grating period. Several physical setups were then designed, created and tested to full rotation of both cleaved bare fibers, as well as clear camera view of the fibers interacting with the chip. One challenge we must still overcome is devising fiber holders that maintain taut fibers, and are thus still in the development stage. Once an appropriate setup is created, our next phase will be to verify the design. This will be accomplished by rotating both fibers until an incident angle with the optimal coupling efficiency is found.

Tracking Singlet Oxygen Reactivity in Thermoset Materials

Cassondra Giffin, Carlos Navarro, Zehan Yu, Steven Nutt, Travis Williams

Carbon fiber-reinforced polymer (CFRP) composites are commonly used in aerospace, wind turbine, and automotive manufacturing. These applications create an abundance of composite waste from production scrap and end-of-service-life parts. The current "recycling" method that's widely used in industry is pyrolysis (essentially the practice of shredding and burning CFRPs with very little recovered energy/material). We are working to recycle CFRP composite materials via a chemical depolymerization approach that maintains the integrity of the woven carbon fibers and returns monomers from the polymer matrix.

A key step in our mechanism uses photocatalysis to enable an initial oxidation event. Our central hypothesis is that photocatalytic generation of singlet oxygen ($^1O_2$) can enable rapid oxidative depolymerization of composites that is not feasible with triplet oxygen conditions. In order to use $^1O_2$ in the recycling process, it must intercalate into a solid, cured epoxy resin. My project is to design and execute an experiment to show for the 3 first time how $^1O_2$ intercalates into a solid resin. I am also analyzing how the resin breaks down throughout the reaction.

In a representative implementation, my experimental design involves creating ten equally sized blocks of the epoxy-resin used in CFRPs infused with $^1O_2$ detector trans-1-(2'-methoxyvinyl)pyrene (MVP). MVP reacts selectively with $^1O_2$ to create a fluorophore (pyrene-1-carbaldehyde) that can be imaged by any type of fluorescence microscopy. I am treating these samples with photogenerated ^{1}O2 and tracking its movement into the resin by imaging the resin block cross-section at regular time intervals. This is revealing how deep into the block the MVP has changed color, thus indicating how far the $^1O_2$ permeated. I am also tracking the degradation rate of the blocks by recording the mass change over time. Once we prove that $^1O_2$ intercalates into the solid resin, we will be able to identify the best depolymerization recycling method. We can then work to scale up this reaction to industry-sized recycling capability. Chemical recycling will conserve valuable CFRP materials, energy, money, and will improve environmental impacts from the current waste disposal methods.

Investigation of Axonal Transport Defects in Drosophila Neuromuscular Junctions Under Injury and Stress Conditions

Isha Sanghvi, Nancy Tran, Dion Dickman

Protein trafficking from the neuronal soma (cell body) to the axon terminal is essential for healthy neuronal functions like neurotransmitter release. However, neural injury and related stress is reported to cause transport defects that reduce the amount of essential proteins in axon terminals. While visible protein accumulations have been observed in Drosophila motor neurons undergoing both injury conditions (a highwire null mutation or hiw) and stress conditions (overexpression of vesicular glutamate transporter or vGlut-OE), it is unknown where in the nervous system these protein trafficking jams originate. In the Dickman lab, we aimed to characterize protein distributions between the soma, axon, and axonal terminal of four genotypic conditions of Drosophila (wild type, hiw, vGlut-OE, and hiw + vGlut-OE) to identify where transport defects first occur.

In answering this guiding question, routine Drosophila dissections were performed to preserve the central nervous system and corresponding axons of the fly. Immunostaining was also utilized to tag protein classes from synaptic vesicle and active zone proteins to transcription factors in the soma. The protein intensities were characterized throughout the model organisms' central and peripheral nervous systems using confocal imaging and corresponding analysis.

Preliminary results demonstrate an increase in protein distributions in the cord and axons in the double mutant condition compared to wild type, hiw, or even vGlut-OE, indicating the origination of protein trafficking defects in the Drosophila central nervous system itself. The double mutant has the lowest protein intensity at the synaptic terminal. Specifically, the double mutant had 370 percent of vGlut intensity in the cord, 1049 percent of vGlut intensity in the axon, and 48 percent of vGlut intensity in the synapse compared to wild type conditions. These data points confirmed the protein trafficking jams in the cord and axons of the mutant inhibited protein transport to the end of the axons.

Ultimately, a translational research lens can be utilized to understand how transport defects in model flies experiencing stress and injury can apply to organisms with neurodegenerative pathology. In the future, the Dickman Lab aims to examine model flies for ALS, Parkinson's, Frontotemporal dementia, and Huntington's to understand the molecular mechanisms which underlie these diseases.

Observing Spatial Arrangements of Mitochondria and Insulin Vesicles in Pancreatic β Cells

Kaylee Tseng, Wen Lin, Aneesh Deshmukh, Kate White

On the cellular level, our bodies are constantly shifting. Structural changes within our cells can occur in seconds, and the spatial organization of changing components over time is critical for proper function. Here, we use fluorescence microscopy to observe arrangements of mitochondria and insulin vesicles in pancreatic β cells. β cells are the producers of insulin, a hormone that stimulates the cellular intake of blood glucose. Deficiencies in β cells are the driving force behind both types of diabetes, but much is unknown about the pathology of these diseases.

While subcellular structures can be imaged with higher resolution using other methods (soft x-ray tomography, cryo-electron microscopy), fluorescence imaging is more flexible; Cells do not need to be fixed, so live images can be taken before and after stimulation. Additionally, a large volume of data can be collected in a short period, and fluorescence eliminates the need for manual segmentation.

Previous studies of β cells found that stimulation with glucose increased the mitochondrial volume, and insulin vesicles had increased proximity to mitochondria. Co-stimulation with exendin-4 (a glucagon-like peptide-1 receptor agonist) prolonged these effects. Observing these trends using fluorescence would confirm the method's ability to resolve subcellular elements, providing an avenue to determine when significant morphological change occurs after stimulation. For this project, NPY-mTurq2 and MitoTracker are used to label vesicles and mitochondria, respectively. NPY-mTurq2 is a fluorescent protein that is transfected into the β cells, while MitoTracker is a dye that stains mitochondria based on membrane potential. The 3D structures of the cells are then reconstructed to analyze distribution patterns of the targeted elements. These results characterize a major structural change that contributes to insulin secretion in β cells.

Peripheral vasoconstriction as a marker of future vaso-occlusive pain in sickle cell anemia

Sabrina Sy, Saranya Veluswamy, Payal Shah, Wanwara (Toey) Thuptimdang, Michael Khoo

Sickle cell anemia (SCA) affects millions of people worldwide, being most prevalent in sub-Saharan Africa, some Mediterranean regions, and India. SCA is a condition that children are born with, so timely diagnosis, treatment, and monitoring of the disease is vital to maintaining a good quality of life. Hospitalization for SCA patients is largely related to the occurrence of painful episodes of vaso-occlusive crisis (VOC), which occur on top of a progressive, chronic vascular disease. VOC events cause not only pain, but also subsequent organ damage and premature death. It is still not known why or how transient regional vaso-occlusion cascades into large-scale VOC. While most of the literature on SCA has focused on hematological factors, there is growing recognition that the autonomic nervous system (ANS) may play a key role in triggering the transition from steady state to VOC. Patients report that their VOC events occur following exposure to stress, pain, and cold temperature, all factors that affect the ANS. Obstructive sleep apnea (OSA) has been reported to be significantly more prevalent in SCA subjects than in the general population.

Recent collaborative work between Dr. Khoo's group at USC-Viterbi and Dr. Coates' team at CHLA led to the derivation of a unique vascular biomarker from finger photoplethysmography (PPG) signals recorded during sleep, called "Mvasoc". It is believed that Mvasoc reflects the effects of all sympathetic neural inputs to the peripheral vasculature. However, there remain unresolved questions. The VOC rates employed previously were based on hospitalization data. In practice, many SCA patients experience VOC pain at home but do not report these episodes. We will determine whether increases in Mvasoc measured nightly by a wearable device at home correlate with patient-reported pain scores the following day. In addition, the same patients will participate in lab studies at CHLA that will determine their vasoconstriction responses to various autonomic stimuli, such as temperature changes. By doing so, we hope to obtain stronger evidence for

Evaluation of microRNA-145 gene therapy on Vascular Smooth Muscle Cells using ApoE-/- atherosclerotic mice model

Woori Lee, Deborah Chin, Eun Ji Chung

Atherosclerosis is characterized by the formation of lipid-rich plaques that exacerbate blood flow and occlude vessels upon rupture. During atherosclerosis, vascular smooth muscle cells (VSMCs), the main cell type composing arteries and plaques, de- and transdifferentiate from a healthy contractile phenotype to a plaque-promoting synthetic phenotype, as well as foam cells, and osteogenic cells. MicroRNA-145 (miR-145) is a key regulator of VSMC phenotypic change by upregulating contractile genes and downregulating synthetic genes and is thus a possible strategy for atherosclerosis therapy. However, when contractile VSMCs transform into synthetic VSMCs, they lose several key markers (e.g. αSMA, myocardin, calponin) that have been traditionally used to identify VSMCs. As such, tracking the efficacy of miR-145 therapy is difficult with traditional models of disease and methods of VSMC identification. To address this issue, our lab has developed a miR-145 micelle nanoparticle to deliver miR-145 therapy to VSMCs and used transgenic ApoE-/- atherosclerotic mice with CreLox activated YFP expression in SMCs. Using this special model, we were able to track the number of cells that are of SMC origin, and how many have gotten effective gene therapy to prevent dedifferentiation into synthetic VSMCs and pathogenic cells. We analyzed the SMCs through immunohistochemistry to look at the structure of the plaques in the arteries and stained for SMC markers. Upon analysis of CD68 inflammatory cell expression in the plaques, we confirmed that PBS and control micelle treated mice had the most inflammation compared to miR-145 micelle treated mice. Plaque size was also smallest in mice treated with miR-145 micelle. In the near future, I will perform gene expression analysis to analyze the miR-145 expression and other markers that are associated with inflammation, synthetic VSMCs, and macrophages, such as CD68, KLF-4, KLF-5, and ELK-1. In conclusion, our studies show the therapeutic effects of miR-145 micelles in murine atherosclerosis models.

USC WOMEN IN SCIENCE AND ENGINEERING

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