

**BIOGRAPHICAL SKETCH**

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NAME: Katharine Leilani Weintraub (née: Bunch)

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: Heed Fellowship

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Start Date MM/YYYY	Completion Date MM/YYYY	FIELD OF STUDY
Cabrillo College - Aptos, CA	A.A.	08/2012	05/2015	Chemistry, Biology, Liberal Arts & Sciences
University of California, Santa Cruz	B.S.	08/2015	06/2017	Biochemistry & Molecular Biology
Medical College of Georgia at Augusta University	M.D.	08/2019	05/2023	Medicine
University of Alabama at Birmingham	n/a	06/2023	6/2027	Ophthalmology

**A. Personal Statement**

My first experience with research was in undergrad, where I joined the Rubin lab in January of 2016. I was given my own project to determine the structure of the active form of the cyclin-dependent kinase 4 (CDK4)-cyclin D1-p27 complex using X-ray crystallography. I developed skills including molecular cloning, primer design, mutant construct development, PCR, DNA purification, baculovirus transfection and transduction, and cell colony maintenance. I expressed and purified different constructs through affinity, ion-exchange, and size-exclusion chromatography. I confirmed protein complex purification via SDS-PAGE, set-up crystallization screens by hand and via Art Robbins Gryphon and Phoenix instruments, helped with crystal looping and Synchrotron remote data collection. My foundational work on this project paved the way for the lab to discover the active form of the CDK4-cyclin D1-p27 complex, which, at the time had evaded elucidation for nearly a decade. It also allowed us to discover the mechanism behind resistance to the breast cancer therapeutic, Palbociclib, a selective CKD4/CKD6 inhibitor. I wrote my undergraduate senior thesis on this work, and the results of this study were published in Science. After graduation and while studying for the MCAT, I joined a neuroscience and regenerative medicine lab as a Research Assistant, where I performed intracranial stereotaxic injections, collected and analyzed genotyping samples, performed biochemical assays, prepared tissue samples for analysis, and analyzed behavioral study results from depression, anxiety, and PTSD murine models. I was not passionate about studying anxiety, depression, and PTSD in mice, so I joined the Tawfik lab, where I was first introduced to the field of ophthalmology. I investigated the role of hyperhomocysteinemia on diabetic retinopathy and age-related macular degeneration through both *in vitro* and *in vivo* work. As the sole employee of the lab, I not only managed inventory, animal colonies, and kept the lab up to OSHA standards, but I also ran all the experiments for several projects. It was in this lab that I developed the ability to isolate and culture mouse primary retinal pigment epithelial cells, perform lentivirus transfection and transductions, western blotting, and immunofluorescence studies. From here, I joined the lab of William Caldwell, where I continued to expand my basic science technical skills through murine models of diabetic retinopathy and retinopathy of prematurity, where I learned how to prepare murine retina flat mounts and continued to refine my retina immunofluorescence staining technique. I enjoyed this research so much, that I continued working part-time in the lab through my first two years of medical school. In residency, I continued research during my intern year, measuring OCT layers in the ALSTAR2 cohort with Drs. Curcio and Owsley. After starting my first year of

ophthalmology, I prioritized developing my clinical and surgical skills. However, I still have managed to stay involved with some research. Currently, I have several retrospective chart review projects with Retina Consultants of Alabama and multiple case reports underway.

## **B. Positions, Scientific Appointments and Honors**

### **Positions and Scientific Appointments**

July 2019-Apr. 2021	Federal Work Study Student – Department of Pharmacology & Toxicology Augusta University, Medical College of Georgia
July 2018-July 2019	Research Assistant – Department of Pharmacology & Toxicology Augusta University, Medical College of Georgia
Dec. 2017 – July 2018	Research Assistant – Oral Biology Department Augusta University, Dental College of Georgia
Aug. 2017 – Dec. 2017	Research Assistant – Neuroscience and Regenerative Medicine Augusta University, Medical College of Georgia
Jan. 2016 – June 2017	Undergraduate Research Assistant – Chemistry Department University of California, Santa Cruz

### **Honors**

March 19 <sup>th</sup> , 2026	UAB Callahan Ophthalmology, Chief Resident  Selected by peers to serve as chief resident for the 2026-2027 academic year.
June 13 <sup>th</sup> , 2025	UAB Callahan Research Symposium Best PGY-2 Poster  Awarded best PGY-2 poster presentation at the annual UAB Callahan Research Symposium for a case on COVID-19 associated periphlebitis, titled “Don’t You (Forget About Me)”.
Aug. 30 <sup>th</sup> 2022	Alpha Omega Alpha Honor Medical Society  Elected to the AOA MCG chapter, a society that recognizes and advocates for excellence in scholarship and the highest standards in the profession of medicine. Was elected by peers to serve as Vice President of the MCG chapter.
Aug. 2022	Dean’s Clinical Honor Society  Received this honor for consistently demonstrated high academic excellence during 3rd year core clinical clerkships.
July 2022	Orien Thomas Gower Scholarship  Provides scholarships to Medical College of Georgia students based on outstanding academic performance, financial need, and qualities of kindness and caring.
July 2022	Dr. Sam Singal Scholarship  Provides scholarships to Medical College of Georgia students based on outstanding academic performance.
Feb. 26 <sup>th</sup> , 2022	Gold Humanism Honor Society  Selected via a blinded application process after peer nomination for demonstrating excellence in clinical care, leadership, compassion, and dedication to service.

Feb. 2022	Annual GSO Georgia Eye Meeting Poster Competition Winner  Poster competition at the Georgia Society of Ophthalmology's annual Georgia Eye Meeting for ophthalmology residents and medical students in the state of Georgia. Was awarded first place for my research on diabetic retinopathy and PEG-arginase1.
Spring 2017	B.S. awarded, summa cum laude from University of California, Santa Cruz
Spring 2017	Dean's Undergraduate Research Award  Award for outstanding scholarship and creativity among undergraduate students. Received award for my senior thesis on my CDK4-cyclin D1-p27 project. Presented posters on this project at the Undergraduate Research Symposium two years in a row and at the Oakes Senior Showcase.
Winter 2017	Koret Undergraduate Research Scholarship  Scholarship program that provides funding for a variety of undergraduate research projects. Received this scholarship for work on my CDK4-cyclin D1-p27 project and presented a poster at the Koret Research Scholars Slam.
Fall 2016	Doug Drexler Chemistry Scholarship  Awarded one of four scholarships that are given each year to upper division undergraduates who demonstrate outstanding academic achievement in chemistry.
Spring 2015	Cannon B. Jensen Memorial Scholarship  Awarded in recognition of outstanding chemistry students at Cabrillo College.

### C. Contributions to Science

**Undergraduate (part-time):** My undergraduate contribution to science was my role in helping the lab discover the active form of the CDK4-cyclin-D1-p27 complex and its mechanism of resistance to CDK4/CDK6, breast cancer specific inhibitors like palbociclib, ribociclib, and abemaciclib.

Guiley, K.Z, Stevenson, J.W, Lou, K., Barkovich, K.J, Kumarasamy, V., Wijeratne, T.U, **Bunch, K.L**, Tripathi, S, Knudsen, E.S, Witkiewicz, A.K, Shokat, K.M, Rubin, S.M. *p27 allosterically activates cyclin-dependent kinase 4 and antagonizes palbociclib inhibition*. ***Science Magazine***: Volume 366, Issue 6471, 13 Dec. 2019.

**Research Assistant (full-time):** I worked as a research assistant full-time for almost 2 years. Initially, I joined Xin-Yun Lu's lab, where I helped to prepare the lab to work with Inscopix's nVoke *in vivo* calcium imaging technology to map and manipulate firing neurons in real time in freely moving and behaving mice. Unfortunately, inducing PTSD, anxiety, and depression in mice was not something I found fulfilling, so I joined Amany Tawfik's lab where I was first introduced to retina research. In this lab, I utilized immunofluorescence staining and immunohistochemistry to demonstrate the presence of elevated homocysteine in the retinas of different diabetic murine models. Subsequently, I joined the lab of Dr. William Caldwell, where I first helped author a review article on mechanisms of obesity-induced metabolic and vascular dysfunction. Then, I helped design, execute, and co-author a study demonstrating the protective effect of arginase 2 deletion in a diabetic mouse model.

Atawia, R.T.†; **Bunch, K.L.** †; Fouda, A.Y.; Lemtalsi, T.; Eldahshan, W.; Xu, Z.; Saul, A.; Elmasry, K.; Al-Shabrawey, M.; Caldwell, R.B.; Caldwell, R.W. *Role of Arginase 2 in Murine Retinopathy Associated with Western Diet-Induced Obesity*. ***Journal of Clinical Medicine***. 22 Jan. 2020, 9, 317.

†Equal contributions

Atawia, R.T, **Bunch, K.L**, Toque, H.A, Caldwell, R.B, Caldwell, R.W. *Mechanisms of Obesity-Induced Metabolic and Vascular Dysfunctions*. ***Frontiers in Bioscience: A Landmark Edition, Frontiers in Bioscience***, 1 Mar. 2019.

Tawfik A, Mohamed R, Elsherbiny NM, DeAngelis MM, Bartoli M, Al-Shabrawey M. *Homocysteine: A Potential Biomarker for Diabetic Retinopathy*. *J Clin Med*. 2019 Jan 19;8(1):121. doi: 10.3390/jcm8010121. PMID: 30669482; PMCID: PMC6352029. ([Acknowledgement for IHC/IF](#))

**Federal Work Study Student (part-time):** While in medical school full-time, I continued my research part-time in the Caldwell lab as a Federal Work study student, where I helped design, execute, and co-author a study on the effect of systemic administration of pegylated arginase 1 in a murine model of diabetic retinopathy. This study demonstrated the protective effect of arginase 1 in the development and progression of diabetic retinopathy. I also authored a review manuscript summarizing novel therapeutics that target the pathophysiologic processes involved in diabetic retinopathy and macular edema.

Abdelrahman A, **Bunch KL**, Sandow PV, Cheng PN, Caldwell RB, Caldwell RW. *Systemic Administration of Pegylated Arginase-1 Attenuates the Progression of Diabetic Retinopathy*. *Cells*. 2022 Sep 16;11(18):2890.

**Bunch, K.L.**, Abdelrahman, A., Caldwell, R.B., Caldwell, R.W. *Novel Therapeutics for Diabetic Retinopathy & Diabetic Macular Edema: A Pathophysiologic Perspective*. *Frontiers in Physiology*. 18 Feb. 2022.

**Residency:** During residency I have continued research, but in a more clinical capacity. As an intern, I measured OCT layers from hundreds of patients in the ALSTAR2 trial. This year, I've been working on several retrospective studies with the Retina Consultants of Alabama. Projects near completion include a retrospective chart review determining the presence of ocular comorbid conditions (Eg: frequency of retinal tears, detachments), or lack thereof, in patients with asteroid hyalosis. Another project near completion assessed the outcomes of macular hole and macular pucker repairs performed by second year retina fellows and compared their outcomes to those in the literature performed by experienced vitreoretinal surgeons. Additionally, I am in the process of compiling several case reports that I will be submitting for publication in the coming months.

#### D. Scholastic Performance

YEAR	COURSE TITLE	GRADE
<b>Medical College of Georgia</b>		
Fall 2019	Cell and Molecular Basis	S
Fall 2019	Tissue and Musculoskeletal System	S
Fall 2019	Cardiopulmonary	S
Fall 2019	Physical Diagnosis	CP
Fall 2019	Problem Based Learning	CP
Fall 2019	Foundations	CP
Spring 2020	Genitourinary	S
Spring 2020	Gastrointestinal System and Nutrition	S
Spring 2020	Head and Neck Special Senses	S
Spring 2020	Med Neuro/Behavioral Health	S
Spring 2020	Phase 1 Comprehensive Module	S
Spring 2020	Physical Diagnosis	CP
Spring 2020	Problem Based Learning	CP
Spring 2020	Foundations	CP
Fall 2020	Fundamentals	S
Fall 2020	Hem/GI	S
Fall 2020	Central Nervous System	S
Fall 2020	Musculoskeletal/Skin	S
Fall 2020	Physical Diagnosis	CP
Fall 2020	Problem Based Learning	CP

YEAR	COURSE TITLE	GRADE
Fall 2020	Foundations	CP
Spring 2021	USLME Prep Elective	S
Spring 2021	Cardiopulmonary	S
Spring 2021	Renal	S
Spring 2021	Endocrine/Reproductive	S
Spring 2021	Physical Diagnosis	S
Spring 2021	Problem Based Learning	S
Spring 2021	Foundations	S
Spring 2021	Basic Clerkship OBGYN	A
Fall 2021	Basic Clerkship Family Medicine	A
Fall 2021	Basic Clerkship in Medicine Pt 1	A
Fall 2021	Basic Clerkship in Neurology	A
Fall 2021	Basic Psychiatry	A
Fall 2021	Basic Clerkship in Surgery Core	A
Spring 2022	USMLE Prep Elective	S
Spring 2022	Ophthalmology Externship	S
Spring 2022	Ophthalmology Research Elective	S
Spring 2022	Basic Clerkship in Peds	A
Fall 2022	Respiratory Care	S
Fall 2022	Ambulatory Adult Select	A
Fall 2022	Essence of Clinical Medicine 4	CP
Fall 2022	Care of the Chronic and Term Patient	S
Fall 2022	Ophthalmology Off-Campus Externship	S
Spring 2023	Anesthesia Critical Care	A
Spring 2023	Emergency Medicine Clerkship	A
Spring 2023	Medicine Sub-I	A

GPA: 4.00

Key: S= satisfactory; CP=continued progress