BIOGRAPHICAL SKETCH

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NAME: Bajar, Bryce Thomas

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POSITION TITLE: Heed Fellowship

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Start Date MM/YYYY	Completion Date MM/YYYY	FIELD OF STUDY
Stanford University Stanford, CA	BS	09/2010	06/2014	Bioengineering
University of California, Los Angeles Los Angeles, CA	PhD	07/2017	05/2021	Neuroscience
University of California, Los Angeles Los Angeles, CA	MD	08/2015	06/2023	Medicine
University of California, San Francisco San Francisco, CA	Residency	06/2023	06/2027	Ophthalmology

A. Personal Statement

My scientific background lies at the intersection of *in vivo* cellular imaging and visual circuit development. I am committed to a career as a clinician scientist at a leading academic center, where I hope to leverage my longstanding research interests to enhance our understanding of clinical ophthalmology and advance management of ophthalmic disease.

I obtained an undergraduate degree in Bioengineering at Stanford University, where my research focused on the development of fluorescent reporters for molecular imaging in live single cells. In work with Markus Covert PhD and Michael Lin MD PhD in the Department of Bioengineering, I engineered or contributed to the development of several genetically encoded tools with broad utility in single-cell biology, including: the kinase translocation reporter, a fluorescent reporter of specific kinase activity; the uniquely bright and photostable fluorescent proteins mClover3 and mRuby3; fluorescent ubiquitination-based cell cycle indicator (Fucci4), a system of fluorescent reporters that enables tracking of cell cycle phases, and rewiring of aberrant signaling to effector release (RASER), a method to link oncogenic growth receptor activity with specific release of intracellular cancer therapeutics. This work has been featured in *Cell* in 2014, *Nature Methods* in 2016, and *Science* in 2019.

Next, I received my MD and PhD degrees through the UCLA-Caltech Medical Scientist Training Program. My PhD in Neuroscience working with Larry Zipursky PhD and Orkun Akin PhD focused on developmental activity during circuit assembly. Using state-of-the-art imaging and genetic techniques, I discovered developmental activity during visual circuit formation in *Drosophila*, identified molecular and cellular mechanisms governing this activity, and described its role in modulating synapse formation in the retina. Based on these findings, I was awarded the Samuel Eiduson Award for best dissertation by the UCLA Brain Research Institute, as well as the Genetics Society of America award for best scientific image of 2023. This work was funded by a Ruth L. Kirschstein Fellowship from the National Eye Institute and was reported in *Nature*, *Developmental Neurobiology*, and *Neuron*.

Currently, I am a resident physician in the Department of Ophthalmology at UCSF. At the laboratory level, I work with Yvonne Ou MD in work funded by the All May See Foundation investigating the role of neuronal activity in the re-assembly of retinal circuits via retinal ganglion cell transplantation. In my clinical research with Ying Han MD PhD and Yvonne Ou MD, I am interested in leveraging my background in imaging and neuronal activity to explore improved structural and functional diagnostics for glaucoma, including adaptive optics scanning laser ophthalmoscopy and pattern electroretinography. We are actively preparing manuscripts based on this work.

In addition to my research background, I am deeply committed to medical education and outstanding clinical and surgical care. Throughout my academic career I have taught medical school and graduate school classes ranging from human anatomy to two-photon imaging. Mentorship has been a source of great joy for me: my academic mentees have gone on to excellent graduate and medical schools. Finally, I am particularly proud of my service for underserved patient populations at the San Francisco General Hospital, where my ophthalmic care was recently recognized with the Julius R. Krevans award.

B. Positions and Honors

Positions and Employment

2023 – Present	Resident Physician, Department of Ophthalmology, UC San Francisco (San Francisco, CA)
2017 – 2021	Graduate Student Research Assistant, Department of Biological Chemistry, David Geffen School of Medicine at UCLA (Los Angeles, CA)
2012	Contractor, NASA Ames Research Center (Moffett Field, CA)
2011 – 2015	Undergraduate Assistant, Stanford University (Stanford, CA)

Honors

2025	Julius R Krevans Award for Clinical Excellence
2023	Genetics Society of America Drosophila Image Award
2021	29th Annual Samuel Eiduson Award
2018	National Eye Institute Ruth L. Kirschstein National Service Research Award
2015	NIH Medical Scientist Training Program Fellowship
2014	Stanford Award of Excellence
2012	NASA California Space Grant Consortium Scholarship
2010	Comcast Leaders and Achievers Scholarship

C. Contributions to Science

1. **Engineering fluorescent reporters for live cell imaging**
   Undergraduate Research: Stanford University, 2011 – 2015
   Advisors: Markus Covert PhD, Department of Bioengineering; Michael Lin MD PhD, Department of Bioengineering
   Representative publications:
   a. Regot S., Hughey J.J., **Bajar B.T.**, Carrasco S., Covert M.W.: High-sensitivity measurements of multiple kinase activities in live single cells. **Cell**. 2014. 157(7):1724-34. PMID: 24949979.
   b. **Bajar B.T.**, Wang E.S., Lam A.J., Kim B.B., Jacobs C.L., Howe E.S., Davidson M.W., Lin M.Z., Chu J. Improving brightness and photostability of green and red fluorescent proteins for live cell imaging and FRET reporting. **Scientific Reports**. 2016. 6:20889. doi:10.1038/srep20889. PMID: 26879144
   c. **Bajar B.T.***, Lam A.J.*, Badiee R.K., Oh Y.H., Chu J., Zhou X.X., Kim N., Chung M., Yablonovitch A.L., Cruz B.F., Kulalert K., Tao J.J., Meyer T., Su X.D., Lin M.Z. Fluorescent indicators for simultaneous reporting of all four cell cycle phases. **Nature Methods**. 2016 Dec;13(12):993-996. PMID: 27798610. *These authors contributed equally.
   d. Chung H.K., Zou X., **Bajar B.T.**, Brand V.R., Huo Y., Alcudia J.F., Ferrell J.E., Lin M.Z. A compact synthetic pathway rewires cancer signaling to therapeutic effector release. **Science**. 2019 May 3;364(6439). PMID: 31048459

Genetically encoded fluorescent biosensors enable monitoring molecular and cellular activity at the single-cell level. My undergraduate research focused on engineering new fluorescent proteins and fluorescent reporters for use in live cell imaging of cellular processes. Working with the Covert lab, I contributed to the development of a fluorescent reporter of kinase activity that specifically reports phosphorylation by specific kinases with nucleocytoplasmic translocation. We used this kinase translocation reporter to characterize single cell kinase responses to cellular stress. Working with the Lin lab, my colleagues and I developed uniquely bright and photostable fluorescent proteins, mClover3 and mRuby3, that were at the time of publication the most efficient fluorescent protein pair for Förster resonance energy transfer (FRET). Additionally, I developed Fucci4, a system of fluorescent reporters that enables simultaneous differentiation of all four phases of the cell cycle. Fucci4 uses a pre-existing reporter that distinguishes the G1 phase from the S/G2/M phase and adds novel single-channel

reporters that indicate the S/G2 transition and the M-phase. Fucci4 has been used for finer analysis of cell cycle transition dynamics in physiology, in disease, and in response to pharmacological intervention.

2. **The coordination and role of developmental activity during visual circuit assembly**
   Graduate Student Research: University of California, Los Angeles, 2017 - 2021
   Advisors: S. Lawrence Zipursky PhD, Department of Biological Chemistry; Orkun Akin PhD, Department of Neurobiology
   Representative publications:
   a. Akin O.*, **Bajar B.T.***, Keles M.F., Frye M.A., Zipursky S.L. Cell-type-specific patterned stimulus-independent neural activity in the developing Drosophila visual system during synapse formation. **Neuron**. 2019 Mar 6;101(5):894-904. PMID: 30711355 * These authors contributed equally
   b. **Bajar B.T.**, Phi N.T., Isaacman-Beck J., Reichl J., Randhawa H., Akin O. A discrete neuronal population coordinates brain-wide developmental activity. **Nature**. 2022 Feb;602(7898):639-646. doi: 10.1038/s41586-022-04406-9. PMID: 35140397

My dissertation research focused on developmental activity and circuit assembly. I discovered developmental activity in *Drosophila*, elucidated cellular mechanisms that coordinate this activity throughout the brain, and identified its role in modulating synapse formation. Prior to this work, the prevailing notion was that activity did not play a role in invertebrate brain development. Using *in vivo* two-photon calcium imaging, I observed that patterned, stimulus-independent neuronal activity begins shortly after the onset of synaptogenesis in the development of the adult *Drosophila* brain. Through a series of genetic screens, my colleagues and I identified a small population of cells expressing the calcium channel Trpγ that coordinates this brain-wide developmental activity. We further found that this developmental activity modulates synapse number in the visual system. Our results suggest that developmental activity is a fundamental feature of neural development, and leveraging genetic advantages in the fly provide unique insight into how such activity contributes to circuit assembly.

3. **Systemic outcomes of retinal disease**
   Clinical Research: University of California, Los Angeles, 2021 – 2023
   Advisors: Pradeep Prasad MD, Hamid Hosseini MD, David Sarraf MD
   Representative publications:
   a. Bakhoum C.Y., Au A., Bousquet E., Matesva M., Singer M.B., Jayaraj C., Romero-Morales V.A., Somisetty S., Santina A., **Bajar B.,** DeMaria A.N., Goldbaum M.H., Meadows J., Spatz E.S., Sarraf D., Bakhoum M.F. Retinal ischemic perivascular lesions are associated with stroke in individuals with atrial fibrillation. **Journal of the American Heart Association.** 2024 Aug 27:e035079. doi: 10.1161/JAHA.123.035079. PMID: 39190603.
   b. Au A., **Bajar B.T.,** Wong B.M., Daskivich L.P., Hosseini H., Prasad P. Systemic and ocular outcomes in patients with young-onset type 2 diabetes. **J Diabetes Complications**. 2023 Dec 22;38(2):108670. doi: 10.1016/j.jdiacomp.2023.108670. PMID: 38219336

My clinical investigation in ophthalmology during medical school focused on relationships between retinal disease and systemic disease, including a correlation between retinal ischemic perivascular lesions and stroke, and severe ocular and systemic outcomes in patients with young-onset type II diabetes.

For my complete bibliography, please see: https://www.ncbi.nlm.nih.gov/pubmed/?term=bryce+bajar

D. Scholastic Performance

YEAR	COURSE TITLE	GRADE
	STANFORD UNIVERSITY	
2010	The Art of Living	A
2010	Chemical Principles	B+
2010	Introduction to Brain and Behavior	B
2010	Linear Algebra and Differential Calculus of Several Variables	B
2011	Structure and Reactivity	A-
2011	The Fate of Reason I	A
2011	Sleep and Dreams	A+
2011	Writing & Rhetoric I	A

YEAR	COURSE TITLE	GRADE
2011	Introduction to Bioengineering	A-
2011	Programming Methodology	A
2011	The Fate of Reason II	A
2011	Origin of Mental Life	A+
2011	Genetics, Biochemistry, and Molecular Biology	A
2011	Fundamentals for Engineering Biology Lab	A
2011	Organic Monofunctional Compounds	A
2011	Justice	A
2012	Cell Biology and Animal Physiology	A-
2012	Writing & Rhetoric II	A
2012	Core Molecular Biology Laboratory	S*
2012	Physical Biology of Macromolecules	B
2012	Mechanics	B
2012	Classical Mechanics Laboratory	S
2012	Anatomy for Bioengineers	A-
2012	Physical Chemical Principles	A-
2012	Electricity and Magnetism	B+
2012	Electricity and Magnetism Lab	S
2012	Systems Biology	A
2012	Organic Chemistry Laboratory I	B+
2012	Ordinary Differential Equations with Linear Algebra	B+
2012	Biostatistics	A
2013	Organic Chemistry Laboratory II	A
2013	Ethics in Bioengineering	A-
2013	Organic Polyfunctional Compounds	B+
2013	Astrobiology and Space Exploration	A+
2013	Physician Shadowing: Stanford Immersion in Medicine Series	S
2013	Undergraduate Research	A
2013	Physical Biology of Cells	B+
2013	Systems Physiology and Design	A-
2013	Tissue Engineering	A+
2013	Bioengineering Departmental Research Colloquium	S
2013	Undergraduate Research	A
2013	Senior Capstone Design I	A+
2013	Principles and Practices of Optogenetics for Optical Control of Biological Tissues	A
2013	Biochemistry I	A
2013	Light and Heat	A
2013	Light and Heat Laboratory	S
2013	Introduction to Neurology Seminar	S
2014	Senior Capstone Design II	A
2014	Physician Shadowing: Stanford Immersion in Medicine Series	S
2014	Social and Ethical Issues in the Neurosciences	A
2014	Cancer Biology	A
2014	Regional Study of Human Structure	A+
2014	Biotechnology	A
2014	Biosecurity and Bioterrorism Response	A+
2014	Team Leadership in the Cardinal Free Clinics	S

YEAR	COURSE TITLE	GRADE
	DAVID GEFFEN SCHOOL OF MEDICINE AT UCLA §	
2015	Foundations of Medicine I	P
2015	Cardiovascular, Renal, and Respiratory Medicine I	P
2016	Gastrointestinal, Endocrine, and Reproductive Medicine I	P
2016	Musculoskeletal Medicine	P
2016	Medical Neurosciences I	P
2016	Foundations of Medicine II	P
2016	Medical Neurosciences II	P
2017	Gastrointestinal, Endocrine, and Reproductive Medicine II	P
2017	Cardiovascular, Renal, and Respiratory Medicine II	P
	DAVID GEFFEN SCHOOL OF MEDICINE AT UCLA, INTERDEPARTMENTAL NEUROSCIENCES PROGRAM	
2017	Cellular Neurophysiology	A+
2017	Introduction to Current Literature in Neuroscience	S*
2017	Oral and Written Presentation in Neuroscience	S
2018	Systems Neuroscience	A
2018	Current Literature in Neuroscience	S
2018	Synapses to Circuits	S
2018	Integrity in Scientific Investigation	S
2018	Current Literature in Neuroscience	S
2019	Phenotypic Measurements of Complex Traits	A
2020	Experimental Statistics	A+

* Class is graded S (satisfactory) or U (unsatisfactory), where satisfactory is considered C- or better.
** Class is graded CR (credit) or NC (no credit), where credit is considered C- or better.
§ Preclinical courses at the David Geffen School of Medicine at UCLA are graded P (pass) or NP (no pass), where passing is defined as 70% or higher with the exception of “Cardiovascular, Renal, and Respiratory Medicine I”, which had a passing performance of 65%.