

CONTACT

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EMPLOYMENT

Harvard Medical School | Beth Israel Deaconess Medical Center, Boston, MA

Assistant Professor

2025 – present

Harvard Medical School, Boston, MA

Research Fellow & Instructor

2020 – 2025

Harvard Society of Fellows, Cambridge, MA

Junior Fellow

2015 – 2020

Q-State Biosciences, Cambridge, MA

Chief Scientific Officer

2015

EDUCATION

Harvard University, Cambridge, MA

PhD in Applied Physics
Advisor: Adam E. Cohen

2009 – 2014

Massachusetts Institute of Technology, Cambridge, MA

BSc in Physics
Advisor: Marc A. Baldo

2005 – 2009

ADVISORY

Jura Biosciences, Boston, MA

2024 – present

HONORS

MIND Prize, Pershing Square Foundation

2026

Career Award at the Scientific Interface, Burroughs Wellcome Fund

2018

Young Investigator, Brain & Behavior Research Foundation

2017

Elected to Harvard Society of Fellows

2015

Harold M. Weintraub Graduate Student Award

2014

(13 recipients worldwide)

Physics of Living Systems Fellow, National Science Foundation

2013

Graduate Research Fellowship, National Science Foundation

2009

SELECTED PUBLICATIONS

Most important publications are colored blue
(* co-first authors), († corresponding author)

Full publication history:
<http://scholar.google.com/citations?user=KeNcK2wAAAAJ&hl=en&oi=ao>

From the Lab:

Thyroid hormone and the brain
D. R. Hochbaum[†], B. L. Sabatini[†]. *Current Biology*, **35**, 20, 999-1004 (2025).

Prior:

Thyroid hormone remodels cortex to coordinate body-wide metabolism and exploration

D. R. Hochbaum, *et. al.*, *Cell*, **187**, 1–19, (2024).

[https://www.cell.com/cell/fulltext/S0092-8674\(24\)00835-3](https://www.cell.com/cell/fulltext/S0092-8674(24)00835-3)

Longevity, demographic characteristics, and socio-economic status are linked to triiodothyronine levels in the general population

R. Lawton, B. Sabatini[†], **D. R. Hochbaum[†]**, *Proceedings of the National Academy of Sciences*, **121** (2), e2308652121 (2024).

<https://www.pnas.org/doi/10.1073/pnas.2308652121>

Single-cell analysis of experience-dependent transcriptomic states in the mouse visual cortex

S. Hrvatin*, **D. R. Hochbaum***, *et. al.*, *Nature Neuroscience*, **21**, 120–129 (2018).

<https://www.nature.com/articles/s41593-017-0029-5>

Analysis of thermogenesis experiments with CalR

M. D. Cortopassi, D. Ramachandran, W. B. Rubio, **D. R. Hochbaum**, B. L. Sabatini, A. S. Banks. *Brown Adipose Tissue: Methods and Protocols*, 43–72 (2022).

Activity-dependent regulome of human GABAergic neurons reveals new patterns of gene regulation and neurological disease heritability

G. L. Boulting, E. Durresi, B. Ataman, M. A. Sherman, K. Mei, D. A. Harmin, A. C. Carter, **D. R. Hochbaum**, *et. al.*, *Nature Neuroscience*, **24**, 437–448 (2021).

Anatomical and single-cell transcriptional profiling of the murine habenular complex

M. L. Wallace, K. W. Huang, **D. R. Hochbaum**, M. Hyun, G. Radeljic, B. L. Sabatini. *Elife*, **9**, e51271 (2020).

A supervised, symmetry-driven, GUI toolkit for mouse brain stack registration and plane assignment

M. Cicconet, **D. R. Hochbaum**. *BioRxiv*, 781880 (2019).

Distinct cortical-thalamic-striatal circuits through the parafascicular nucleus

G. Mandelbaum, J. Taranda, T. M. Haynes, **D. R. Hochbaum**, *et. al.*, *Neuron*, **102**, 636–652 (2019).

A robotic multidimensional directed evolution approach applied to fluorescent voltage reporters

K. D. Piatkevich, E. E. Jung, C. Straub, C. Linghu, D. Park, H. J. Suk, **D. R. Hochbaum**, *et. al.*, *Nature Chemical Biology*, **14**, 352–360 (2018).

Early-life gene expression in neurons modulates lasting epigenetic states

H. Stroud, S. C. Su, S. Hrvatin, A. W. Greben, W. Renthal, L. D. Boxer, M. A. Nagy, **D. R. Hochbaum**, B. Kinde, H. W. Gabel, M. E. Greenberg. *Cell*, **171**, 1151–1164 (2017).

Bots for software-assisted analysis of image-based transcriptomics

M. Cicconet, **D. R. Hochbaum**, D. L. Richmond, B. L. Sabatini. *Proceedings of the IEEE International Conference on Computer Vision Workshops*, 134–142 (2017).

From PhD:

All-optical electrophysiology in mammalian neurons using engineered microbial rhodopsins

D. R. Hochbaum*, Y. Zhao*, *et. al.*, *Nature Methods*, **11**, 825–833 (2014).

<https://www.nature.com/articles/nmeth.3000>

Optical recording of action potentials in mammalian neurons using a microbial rhodopsin

J. Kralj*, A. Douglass*, **D. R. Hochbaum***, D. Maclaurin, A. E. Cohen. *Nature Methods*, **9**, 90–95 (2012).

<https://www.nature.com/articles/nmeth.1782>

Electrical spiking in Escherichia coli probed with a fluorescent voltage-indicating protein

J. Kralj, **D. R. Hochbaum**, A. Douglass, A. E. Cohen. *Science*, **333**, 345–348 (2011).

<https://www.science.org/doi/10.1126/science.1204763>

Roadmap on neuromerics

Y. K. Cho, G. Zheng, G. J. Augustine, **D. R. Hochbaum**, *et. al.*, *Journal of Optics*, **18**, 093007 (2016).

Bright and fast multicoloured voltage reporters via electrochromic FRET

P. Zou, Y. Zhao, A. Douglass, **D. R. Hochbaum**, D. Brinks, C. Werley, D. Harrison, R. Campbell, A. E. Cohen. *Nature Communications*, **5**, 4625 (2014).

Flash memory: photochemical imprinting of neuronal action potentials onto a microbial rhodopsin

V. Venkatachalam, D. Brinks, D. Maclaurin, **D. R. Hochbaum**, J. Kralj, A. E. Cohen. *J. Am. Chem. Soc.*, **136**, 2529–2537 (2014).

Measuring membrane voltage with microbial rhodopsins

A. E. Cohen, **D. R. Hochbaum**. *Methods Mol. Biol.*, **1071**, 97–108 (2014).

From Undergrad:**Reducing recombination losses in planar organic photovoltaic cells using multiple step charge separation**

T. D. Heidel, **D. R. Hochbaum**, J. M. Sussman, V. Singh, M. E. Bahlke, I. Hiromi, J. Lee, M. A. Baldo. *J. Applied Physics*, **109**, 10 (2011).

RESEARCH
SUPPORT**Simons Collaboration on the Plasticity and the Aging**

Brain, Simons Institute

“Brain specific thyroid hormone dysfunction drives age related cognitive changes”

09/01/25 – 08/30/30

(\$1,100,000)

Career Award at the Scientific Interface, BWF

“Parsing learning-dependent circuit remodeling from spatiotemporally resolved cell states”

09/01/19 – 12/31/27

(\$500,000)

Bipolar Disorder Seed Grant, Harvard Brain Initiative

“Thyroid hormone modulation of dopamine signaling as a molecular and circuit mechanism underlying mania and depression”

07/01/25 – 06/30/27

(\$174,000)

Quadrangle Fund for Advancing and Seeding

Translational Research, Harvard University

“Brain specific modulation of thyroid hormone levels”

07/01/25 – 06/30/26

(\$73,000)

Network on Biomarker Collection and Measurement in Population Studies of Aging

5R24AG054365-07, SUBK00021321, NIH/NIA

“Measuring free T3 from dry blood spots for demographic studies”

09/01/23 – 03/31/25

(\$23,000)

Biology of Trauma Initiative, Broad institute

“The transcriptional encoding of trauma-relevant cortical states and their impacts on neural circuits.”

07/01/23 – 12/31/24

(\$125,000)

Biology of Trauma Initiative, Broad institute

“Causal examination of the connections between traumatic exposure and thyroid signaling in a representative human population.”

02/01/23 – 06/30/24

(\$108,000)

NARSAD Young Investigator Grant, BBRF

“A single cell transcriptomic study of hyperthyroidism”

01/15/18 – 01/14/20

(\$70,000)

PATENTS

A. E. Cohen, **D. R. Hochbaum**, P. Zou, S. Farhi, R. Campbell, Y. Zhao, D. J. Harrison, “Optogenetic probes for measuring membrane potential”, US Patents 9518103 & 10457715 & 10800829

A. E. Cohen, J. M. Kralj, A. D. Douglass, **D. R. Hochbaum**, “Systems, methods, and workflows for optogenetics analysis”, US Patents 9207237, 9702874, & 10161937

N. Klapoetke, E. Boyden, Y. Cho, B. Chow, G. Wong, A. E. Cohen, **D. R. Hochbaum**, “Light-gated ion channels with fast kinetics and high sensitivity”, US Patent 10392426

A. E. Cohen, D. Maclaurin, **D. R. Hochbaum**, J. M. Kralj, “Systems and methods for imaging at high spatial and/or temporal precision”, US Patent App. 14/359387

A. E. Cohen, K. C. Eggen, J. M. Kralj, **D. R. Hochbaum**, G. Dempsey, “Systems and methods for assessing inter-cell communication”, US Patent App. 15/515027

INVITED TALKS

New Faculty Flash Talks, Beth Israel Deaconess Medical Center, Boston, MA	Sep. 2025
American Thyroid Association Annual Meeting, Scottsdale, AZ	Sep. 2025
Local Control of Thyroid Hormone Action Consortium, Essen University, Essen, Germany	Mar. 2025
F.M. Kirby Neurobiology Center seminar series, Boston Children’s Hospital, Boston, MA	Jan. 2024
Department of Molecular Biology seminar series, Mass. General Hospital, Boston, MA.	Mar. 2023
Department of Neurobiology seminar series, UMass Medical School, Worcester, MA.	Nov. 2022
Broad Trauma Initiative kickoff meeting, Cambridge, MA.	Oct. 2022
Neurobiology of Bipolar Disorder, Harvard Brain Initiative, Boston, MA.	May 2022
Stanley Center seminar series, Broad Institute, Cambridge, MA.	Jan. 2022
Integrating Metabolism Across Scales, Janelia Farm, Ashburn, VA.	Aug. 2021
Department of Neurobiology seminar series, HMS, Boston, MA.	Sep. 2020
Harvard Systems Club, Boston, MA.	Sep. 2019
Biophysical Society annual meeting, Baltimore, MD.	Feb. 2015
Roche Pharmaceuticals, Basel, Switzerland	Jan. 2015
Harvard Stem Cell Institute technology series, Cambridge, MA.	Nov. 2014
Fluorescent Proteins and Biosensors, Janelia Farm, Ashburn, VA.	Oct. 2014
American Society for Photobiology annual meeting, San Diego, CA.	Jun. 2014
Biomedical Engineering Society annual meeting, Atlanta, GA.	Oct. 2012
Society for Neuroscience annual meeting, New Orleans, LA.	Oct. 2012
American Society for Cell Biology annual meeting, Denver, CO.	Dec. 2011

TEACHING

Harvard Medical School , Boston, MA	2025
Programming bootcamp for entering graduate students.	
Marine Biological Laboratory , Woods Hole, MA	2014
Physiology course.	

OUTREACH

Health Professions Recruitment & Exposure Program, HMS **2018 – 2024**
Organizing/participating in lab immersion for local high school students, particularly those from underserved and underrepresented backgrounds.

DIRECT MENTEES

Ralph Lawton (PhD candidate, Harvard)	2024-present
Yidong Song (PhD rotation student, HMS biological and biomedical sciences)	2026-present
Aurora Ferrell (PhD rotation student, HMS neurobiology)	2025-present
Lauren Hulshof (PhD rotation student, HMS neurobiology)	2025-present
Madeline Dressel (Research associate)	2025-present
BK Kadriu (Research associate)	2025-present
Isabella Uhniat (Northeastern undergraduate)	2025-present
Lucy Ponce (Harvard undergraduate)	2025-present
Kate Kim (Harvard undergraduate)	2025-present
Rohan Savani (PhD rotation student, HMS neurobiology)	2025
Deshawna Escobedo (Northeastern undergraduate)	2024-2025
Zach Barsdale (PhD rotation student, HMS neurobiology) After: PhD candidate, Broad Institute	2025
Caroline Baynard (Harvard undergraduate) After: MD/PhD candidate, Rockefeller University (Tri-I)	2022-2025
Canaria Park (Associate) After: Scientist, Broad Institute	2022-2023
Yechan Yang (Research associate) After: Master's student, Georgia Tech	2022-2023
Giona Kleinberg (Research associate) After: MD/PhD candidate, University of Colorado	2021-2023
Alexandra Dubinsky (Research associate) After: MD candidate, University of Pittsburgh	2018-2022
Hannah Farnsworth (Research associate) After: PhD candidate, HMS Neurobiology	2018-2021
Keira Robertson (Research associate) After: PhD candidate, Stanford Neurobiology	2016-2019
Nivanthika Wimalasena (Research scientist at Q-State Biosciences) After: PhD candidate, HMS Neurobiology	2014-2015
Vaihbav Joshi (Research associate in Cohen Lab) After: Q-State Biosciences, Vertex Pharmaceuticals	2014
Namrata Anand (Harvard Undergraduate in Cohen Lab) After: PhD candidate, Stanford University	2012-2013