

CONTACT

Center for Life Sciences
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EMPLOYMENT

Harvard Medical School , Boston, MA Incoming Assistant Professor Beth Israel Deaconess Medical Center	2025 – present
Harvard Medical School , Boston, MA Research Fellow & Instructor	2020 – 2024
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

HONORS

Burroughs Wellcome Fund Career Award at the Scientific Interface (CASI)	2018
Brain & Behavior Research Foundation Young Investigator (NARSAD)	2017
Elected to Harvard Society of Fellows	2015
Harold M. Weintraub Graduate Student Award (13 recipients worldwide)	2014
National Science Foundation Physics of Living Systems Fellow	2013
National Science Foundation Graduate Research Fellowship	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>

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 neurophotronics

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

Career Award at the Scientific Interface, BWF **09/01/19 – 08/30/27**
“Parsing learning-dependent circuit remodeling
(\$500,000)
from spatiotemporally resolved cell states”

Network on Biomarker Collection and Measurement in Population Studies of Aging
5R24AG054365-07, SUBK00021321, NIH/NIA **09/01/23 – 03/31/25**
“Measuring free T3 from dry blood spots for demographic studies”
(\$23,000)

Biology of Trauma Initiative, Broad institute **07/01/23 – 12/31/24**
“The transcriptional encoding of trauma-relevant cortical states
(\$125,000)
and their impacts on neural circuits.”

Biology of Trauma Initiative, Broad institute **02/01/23 – 06/30/24**
“Causal examination of the connections between traumatic exposure
(\$108,000)
and thyroid signaling in a representative human population.”

NARSAD Young Investigator Grant, BBRF **01/15/18 – 01/14/20**
“A single cell transcriptomic study of hyperthyroidism”
(\$70,000)

William F. Milton Fund, Harvard University **07/01/16 – 06/30/17**
“All-optical interrogation of dendritic integration”
(\$50,000)

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

TALKS

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

Marine Biological Laboratory , Woods Hole, MA Teaching assistant, Physiology course.	2014
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OUTREACH

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

Committee on Diversity and Inclusion , Neurobiology, HMS Training sub-committee, focused on designing/implementing workshops and courses to advance an inclusive environment and encourage empowerment of all community members.	2020
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DIRECT MENTEES

Lauren Hulshof (Research associate at HMS)	2022-present
Caroline Baynard (Harvard undergraduate at HMS)	2022-present
Deshawna Escobedo (Northeastern Coop at HMS)	2024-present
Canaria Park (Associate at HMS) After: Scientist, Broad Institute	2022-2023
Yechan Yang (Research associate at HMS) After: Master's student, Georgia Tech	2022-2023
Giona Kleinberg (Research associate at HMS) After: MD/PhD candidate, University of Colorado	2021-2023
Alexandra Dubinsky (Research associate at HMS) After: MD candidate, University of Pittsburgh	2018-2022
Hannah Farnsworth (Research associate at HMS) After: PhD candidate, Harvard Medical School Neurobiology	2018-2021
Keira Robertson (Research associate at HMS) After: PhD candidate, Stanford Neurobiology	2016-2019

Nivanthika Wimalasena (Research scientist at Q-State Biosciences) After: PhD candidate, Harvard Medical School Neurobiology	2014-2015
Vaihav 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