Tarun Kamath

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EDUCATION

Harvard Medical School **2020-Present**
Candidate for MD in the Harvard-MIT Health Sciences and Technology Program *Boston, MA*
PhD in Program in Neuroscience *Boston, MA*
Thesis: Internal State Modulation of Striatal Dopamine Signaling
Advisor: Bernardo L. Sabatini

Massachusetts Institute of Technology **2016-2020**
M.Eng. in Biomedical Engineering *Cambridge, MA*
Thesis Advisor: Douglas A. Lauffenburger; *GPA: 4.3/5.0*
S.B. in Brain and Cognitive Sciences and minor in Biomedical Engineering
GPA: 5.0/5.0

Thomas Jefferson High School for Science and Technology **2012-2016**
Advanced Studies Diploma; *GPA: 4.51/4.0* *Alexandria, VA*

RESEARCH EXPERIENCE

Sabatini Lab - Harvard Medical School/Howard Hughes Medical Institute **08/2022 - 06/2025**
Graduate student with Bernardo Sabatini

- Developed and implemented novel fluorescence lifetime imaging modalities to investigate dopamine signaling and resulting effects on motivated behavior and biochemical signaling pathways.
- Researching the neural circuitry underlying hunger-mediated changes in novelty-seeking and exploration behavior.
- Investigated the role of the secondary motor cortex in a 2 choice motor task using 2-photon calcium imaging and dimensionality reduction techniques.

Hyman Lab - Massachusetts General Hospital **05/2017 - 05/2020**
Undergraduate and Graduate student with Bradley Hyman

- Used an assay for aggregated tau protein as a model for Alzheimer's to determine the kinetics of tau aggregation.
- Developed a machine learning based data analysis workflow for analyzing cytation images of fluorescent proteins.

Gurdon Lab - The Gurdon Institute, University of Cambridge **06/2019 - 08/2019**
Summer Undergraduate research student with Sir John Gurdon

- Investigated droplet formation that occurs from binding of transcription factors to DNA.
- Researched the competition between transcription factors binding to the same DNA site to better understand nervous system development.

Hatsopoulos Microfluids Lab - MIT Department of Mechanical Engineering **06/2015 - 10/2015**
High School student with Gareth McKinley

- Used fractional Brownian motion concepts to model the microfluidics of non-Newtonian biological fluids.
- Developed a MATLAB based modeling platform for non-Newtonian fluids using fractional derivative based equations.

PUBLICATIONS

- **Lodder B. and Kamath T. et. al.** The impact of tonic dopamine fluctuations in the nucleus accumbens on downstream signaling and motivation. In preparation.
- Lodder B, Raghubardayal M, Ganesh S, Cai X, Stern J, Sherman M, Rosen P, **Kamath T**, Hartman I, Siegel M, Chouinard J, Lee SJ, Zagoren C, Rosen P, Adan R, Tian L, Sabatini BL (2025). Rapid fluorescence lifetime sensor development of LifeCamp enables transient and baseline absolute calcium measurements. bioRxiv [Preprint] https://doi.org/10.64898/2025.12.23.696288. In revision for PNAS.
- **Kamath T**, Lodder B, Bilsel E, Green I, Dalangin R, Raghubardayal M, Wang W, Capelli P, Legister J, Timmins J, Hulshof L, Wallace JB, Tian L, Uchida N, Watabe-Uchida M, Sabatini BL. Hunger modulates exploration through suppression of dopamine signaling in the tail of the striatum. Neuron. 2025 Dec 3;113(23):4055-4068.e8. doi: 10.1016/j.neuron.2025.09.009. Epub 2025 Oct 2. PMID: 41043421; PMCID: PMC12712896.

- Lodder B, **Kamath T**, Savenco E, Rring B, Siegel M, Chouinard JA, Lee SJ, Zagoren C, Rosen P, Hartman I, Timmins J, Adan R, Tian L, Sabatini BL. Absolute measurement of fast and slow neuronal signals with fluorescence lifetime photometry at high temporal resolution. Neuron. 2025 Nov 5;113(21):3554-3566.e7. doi: 10.1016/j.neuron.2025.08.013. Epub 2025 Sep 11. PMID: 40939592; PMCID: PMC12509219.
- Roshgadol JI, Chouinard JA, Majumder S, Scott EC, Borges K, Hagihara KM, Mancini N, Steveson T, **Kamath T**, Lodder B, MacLennan BJ, Dalangin R, Tjahjono N, Pal A, Soares-Cunha C, Melugin PR, Marley A, Mahe K, Kurima K, Takahashi S, Nosaka D, Murakami K, Colgan LA, Freitas PT, Chaudhuri R, Siciliano CA, Rodrigues AJ, Gradinaru V, Von Zastrow M, Podgorski K, Sabatini BL, Bidaye SS, Hanks TD, Ji N, Wickens JR, Inagaki HK, Tian L. Sensitive dLight3 for imaging broad-spectrum dopamine events across brain regions. Res Sq [Preprint]. 2025 Aug 20:rs.3.rs-7313638. doi: 10.21203/rs.3.rs-7313638/v1. PMID: 40894030; PMCID: PMC12393496. Under review at Nature.
- Dujardin S, Fernandes A, Bannon R, Commins C, De Los Santos M, **Kamath TV**, Hayashi M, Hyman BT. Tau propagation is dependent on the genetic background of mouse strains. Brain Commun. 2022 Feb 23;4(2):fcac048. doi: 10.1093/braincomms/fcac048. PMID: 35350555; PMCID: PMC8952249.
- **Kamath TV**, Klickstein N, Commins C, Fernandes AR, Oakley DH, Frosch MP, Hyman BT, Dujardin S. Kinetics of tau aggregation reveals patient-specific tau characteristics among Alzheimer's cases. Brain Commun. 2021 May 4;3(2):fcab096. doi: 10.1093/braincomms/fcab096. PMID: 34222869; PMCID: PMC8244646.
- Bennett RE, Hu M, Fernandes A, Perez-Rando M, Robbins A, **Kamath T**, Dujardin S, Hyman BT. Tau reduction in aged mice does not impact Microangiopathy. Acta Neuropathol Commun. 2020 Aug 18;8(1):137. doi: 10.1186/s40478-020-01014-4. PMID: 32811565; PMCID: PMC7436970.
- Dujardin S, Commins C, Lathuiliere A, Beerepoot P, Fernandes AR, **Kamath TV**, De Los Santos MB, Klickstein N, Corjuc DL, Corjuc BT, Dooley PM, Viode A, Oakley DH, Moore BD, Mullin K, Jean-Gilles D, Clark R, Atchison K, Moore R, Chibnik LB, Tanzi RE, Frosch MP, Serrano-Pozo A, Elwood F, Steen JA, Kennedy ME, Hyman BT. Tau molecular diversity contributes to clinical heterogeneity in Alzheimer's disease. Nat Med. 2020 Aug;26(8):1256-1263. doi: 10.1038/s41591-020-0938-9. Epub 2020 Jun 22. Erratum in: Nat Med. 2021 Feb;27(2):356. doi: 10.1038/s41591-021-01251-7. PMID: 32572268; PMCID: PMC7603860.
- Busche MA, Wegmann S, Dujardin S, Commins C, Schiantarelli J, Klickstein N, **Kamath TV**, Carlson GA, Nelken I, Hyman BT. Tau impairs neural circuits, dominating amyloid- effects, in Alzheimer models in vivo. Nat Neurosci. 2019 Jan;22(1):57-64. doi: 10.1038/s41593-018-0289-8. Epub 2018 Dec 17. PMID: 30559471; PMCID: PMC6560629.
- Wegmann S, Eftekharzadeh B, Tepper K, Zoltowska KM, Bennett RE, Dujardin S, Laskowski PR, MacKenzie D, **Kamath T**, Commins C, Vanderburg C, Roe AD, Fan Z, Molliex AM, Hernandez-Vega A, Muller D, Hyman AA, Mandelkow E, Taylor JP, Hyman BT. Tau protein liquid-liquid phase separation can initiate tau aggregation. EMBO J. 2018 Apr 3;37(7):e98049. doi: 10.15252/embj.201798049. Epub 2018 Feb 22. PMID: 29472250; PMCID: PMC5881631.

PRESENTATIONS AND INVITED LECTURES

- **Kamath T.** "Dopamine signaling in the tail of striatum integrates internal state to guide novelty exploration", (May, 2025) Invited Speaker at *Gordon Research Seminar on Modulation of Neural Circuits and Behavior*, Vaud, Switzerland.
- **Kamath T.** "Hunger modulates exploration through suppression of dopamine signaling in the tail of striatum", (March, 2025) Poster and abstract at *COSYNE*, Montreal, Canada.
- **Kamath T.** "Dopamine signaling in the tail of striatum integrates internal state to guide novelty exploration", (February, 2025) Invited Speaker at *Harvard Medical School Reinforcement Learning and the Brain Seminar Series.*
- **Kamath T.** "Hunger modulates exploration through suppression of dopamine signaling in the tail of striatum", (November, 2024) Invited Speaker at *Harvard Medical School Department of Neurobiology Seminar Series.*
- **Kamath T.**, Lodder B., Zhou C., Bilsel E., Matias S., Green I., Tjahjono N., Scott E., Berrios J., Tian L., Watabe-Uchida M., Uchida N., Sabatini B.L. "Hunger modulates exploration and associated dopamine fluctuations in the tail of the striatum" (March, 2024). Poster and abstract at *Basal Ganglia Gordon Research Conference*, Ventura, CA.
- **Kamath T.** Cultural differences in the diagnosis of psychiatric diseases. Invited lecturer for *Harvard-MIT Health Sciences and Technology Psychiatry Course, HST.P700*, (March 2023 and 2024).
- **Kamath T.V.**, Commins C., Klickstein N., Oakley D., Hyman B.T., Dujardin S. "Employing an in vitro biosensor assay to investigate tau seeding kinetics within cases of sporadic Alzheimer disease and in a model of tauopathy"(2020). Abstract (doi: 10.1002/alz.047169) and Poster at *Alzheimer's Association International Conference.*

- Dujardin S., Commins C., **Kamath T.V.**, de los Santos M., Dooley P.M., Moore B.D., Jean-Gilles D., Clark R., Kennedy M., Hyman B.T. Relevance of tau seeding for the clinical heterogeneity of Alzheimer's disease: Implication for therapeutic perspectives (2019). Abstract in *Alzheimer's & Dementia* (doi: 10.1016/j.jalz.2019.06.4854) and Presentation at *Alzheimer's Association International Conference*, Los Angeles, CA.
- Busche M., Wegmann S., Dujardin S., Schiantarelli J., **Kamath T.V.**, Nelken I., Hyman B.T. Tau silences neural circuits and blocks the effects of amyloid-beta in vivo (November, 2018) Presentation at the *Society for Neuroscience*, San Diego, CA.
- **Kamath T.V.**, Wagner C., McKinley G.H. (October, 2015) "Modeling the rheological response of common food products using fractional constitutive equations". Poster and abstract at *87th Annual Society of Rheology Conference*, Baltimore, Maryland

LEADERSHIP POSITIONS

Member, NIH U19 Trainee Outcomes Working Group **09/2023 - 09/2024**
- Worked with the NIH as part of a group to assist in trainee wellness in U19, a series of cross-lab collaborative grants

Co-Chair, South Asian Medical and Dental Association **10/2020 - 09/2021**
- Hosted a conference (VariAsians 2021) on the incorporation of cultural humility into clinical skills
- Promoted awareness and discussions around issues of health which intersect with South Asian cultures.

Member, Harvard Medical School Well-Being Steering Committee **01/2021 - 09/2021**
- Represented the interests and specific wellness needs of the HST program to the greater HMS community.

HONORS AND AWARDS

- Recipient, COSYNE Travel Grant **03/2025**
- Recipient, NIDA NIH F30 Predoctoral Dual Degree Fellows Award **03/2024**
- Finalist, Rhodes Scholarship **11/2019**
- Finalist, Poster competition at 87th Annual Society of Rheology Conference **10/2015**

SKILLS AND HOBBIES

Laboratory Techniques: 2-photon imaging, Cell Culture, Fiber photometry, Flow Cytometry, Fluorescence lifetime imaging, Functional Magnetic Resonance Imaging (fMRI) image analysis, *in vivo* optogenetic and chemogenetic manipulations, Immunocytochemistry/Immunohistochemistry, Live Cell Imaging, Rodent Survival Surgery, Rodent Behavioral Assay
Programming Languages: Python, MATLAB, R, HTML, ImageJ/Fiji