AMAR SAHAY PhD

Professor of Psychiatry, '19 James and Audrey Foster MGH Research Scholar
Associate Member, Broad Institute of MIT and Harvard, Principal Faculty, Harvard Stem Cell Institute, Massachusetts General Hospital, Harvard Medical School. www.sahaylab.com

Biography

Amar Sahay is Professor of Psychiatry at Harvard Medical School, '19 James and Audrey Foster MGH Research Scholar and Director of the laboratory on Brain Plasticity and function at the Center for Regenerative Medicine at Massachusetts General Hospital. He is principal faculty of the Harvard Stem Cell Institute of Harvard University and an Associate member of the BROAD Institute of MIT and Harvard. After a year studying signal transduction in Yosef Yarden's laboratory at the Weizmann Institute of Science, Dr. Sahay obtained his doctorate in neuroscience studying semaphorins in axon guidance and synaptic transmission in the laboratories of David Ginty and Alex Kolodkin at the Johns Hopkins University School of Medicine. He performed postdoctoral research in Rene Hen's laboratory at Columbia University where he made seminal contributions to the role of adult-born neurons in memory. **Since launching his independent research program at MGH in 2011, his lab has made pioneering contributions to our understanding of the molecular-, circuit-, and network-plasticity mechanisms of cognition**. The lab's multidisciplinary research program employs molecular-, mouse- and viral-genetics, ex vivo and in vivo electrophysiology, lipid biology, opto-and chemogenetics, in vivo calcium imaging, automated ML behavioral tracking and behavioral assays. Seminal discoveries in the Sahay lab include how genetic risk factors for NDDs (ASD/SCZ/BD/epilepsy) converge upon inhibitory circuit plasticity to regulate network excitability and cognition, identification of a novel lipid signaling mechanism that mediates cognitive resilience in aging and AD through regulation of neuro-immune interactions, synapses and lipid burden in microglia, demonstration of how adult hippocampal neurogenesis contributes to memory, and discovery of a novel feeding circuit.

The Sahay laboratory's discoveries have garnered international recognition and have led to high impact publications in *Nature, Nature Neuroscience, Nature Medicine, Neuron, Nature Communications and Cell reports.* His research is highly cited (eg: Sahay Nature '11 cited >2000 times) and is characterized by rigor and reproducibility and a robust, funding track record exceeding $16 Million in direct costs alone. His patents exemplify how we can harness basic science insights to link genetics with convergent mechanisms that can be targeted to restore cognition and suppress seizures in NDDs, aging and AD. Dr. Sahay's research program is supported by National Institutes of Health (NIMH and NIA), private foundations including the Simons Collaboration on the Plasticity and the Aging Brain, BBRF, and philanthropic support. Dr. Sahay is recipient of the 2011 Janett Rosenberg Trubatch Career Development Award from Society for Neuroscience and a Career Development Award from the American College of Neuropsychopharmacology. In 2013 he was selected as a National Academy of Sciences Kavli Fellow. He is currently a member of the American College of Neuropsychopharmacology and previously, served on the Program Committee for the Society for Neuroscience Annual Meeting and as the SFN appointed member for the Program Committee of the Federation of European Neuroscience Societies. Dr. Sahay is committed to mentoring and teaching and co-directed the Harvard BBS course in Concepts in Development, Self-Renewal and Repair (2014-2019). He currently teaches the neuroscience section of the Leder Human Biology and Translational Medicine Program to Harvard and MIT graduate students at Harvard Medical School. He serves on the faculty steering committee of Harvard Brain Initiative (HBI), a cross Harvard schools neuroscience initiative. Sahay lab alumni have graduated into top graduate and MSTP programs, postdoctoral positions, independent Faculty/Assistant Professorships and biotech jobs. Dr. Sahay's mentees have been awarded NARSAD Young Investigator grants (postdoctoral fellows), K99/R00 award, NIH Diversity Supplements, HHMI Gilliam Fellowships (Harvard Neuroscience Program Graduate students) and Harvard's Hoopes prize (Harvard's highest honor for undergraduate thesis).

Dr. Sahay is co-founder of a seed stage startup focused on lipid biology and a scientific co-founder and advisor on an AI-BIO startup where he led Target ID, aimed at developing therapeutics for AD and other neurodegenerative disorders. Through these ventures, he has garnered experience in target discovery and derisking of small molecule preclinical assets towards DCs. With his co-founder, he built out the SAB, engaged with different stake holders including ex-pharma BD folks, chemists, AI engineers and VCs to raise capital (ongoing). His academic lab is derisking gene therapy and siRNA assets discovered in his lab for NDDs, MASH and AD. In addition, he co-founded LabMate Inc, a startup aimed at connecting postdoctoral fellows with biotech.

Education

Bennington College, Bennington, VT	B.A.	1993-1997	Molecular Biology
Weizmann Institute of Science, Israel		1997-1998	Signal transduction (Yosef Yarden)
Johns Hopkins University SOM, MD	PhD	1998-2004	Neuroscience (Alex Kolodkin and David Ginty)
Columbia University SOM, NY	Postdoctoral	2004-2011	Neuroscience (Rene Hen)

Positions, Scientific Appointments and Honors

2025-pres Co-founder LIPOS BIO Inc
2025-pres American College of Neuropsychopharmacology, Scientific Program Committee
2024-pres. Harvard Brain Science Initiative (HBI) Faculty Steering Committee
2023-pres. Professor of Psychiatry, Center for Regenerative Medicine, Massachusetts General Hospital, Harvard Medical School, Boston, MA
2023-pres Co-founder TAP Neuro Inc
2020-24 Member, Society for Neuroscience Program Committee
2020-22 Member, Federation of European Neuroscience Societies (FENS) Program Committee
2020-2024 Member MGH Neuroscience Leadership Council
2019-pres. Member, American College of Neuropsychopharmacology
2017-2023 Associate Professor, Center for Regenerative Medicine, Department of Psychiatry, Massachusetts General Hospital, Harvard Medical School, Boston, MA
2017 Co-Chair, Kavli-National Academy of Science "Frontiers of Science" symposium
2016-2020 Co-founder LabMate Inc
2016- NIH Center for Scientific Review, Ad hoc Review and Special Emphasis Panel
2015-pres. Associate Member, BROAD Institute of MIT and Harvard, Cambridge, MA.
2015 Co-organizer, Kavli-National Academy of Science neuroscience session, Jerusalem, Israel
2014-2024 Editorial Board, Brain Plasticity
2014-pres. Working advisory group, MGH/McLean Research Concentration Program
2014-2016 Bennington College Dimensional Application Advisory Committee
2014-19 Associate member, American College of Neuropsychopharmacology
2014-19 Co-Director, Concepts in Development, Self-renewal and Repair; BBS Course CB226
2014 Co-organizer, Adult Neurogenesis: From stem cells to therapies, Mumbai, India
2013 Faculty Co-Chair, Eighth Annual Harvard Stem Cell Institute Malkin Retreat, Cambridge, MA
2013 National Academy of Sciences Kavli Fellow
2013-2024. Homebase PTSD research Scientific Committee
2013 Faculty Co-Chair, Eighth Annual Harvard Stem Cell Institute Malkin Retreat, Cambridge, MA
2012-2021. PhD program in Biological and Biomedical Sciences, HMS (BBS) Member
2012-pres. PhD Program in Neuroscience Harvard Medical School, HMS (PiN) Member
2012-pres. Editorial Board, F1000 Research, Genomics and Genetics
2011-pres. F1000 Faculty Member, Animal Genetics section
2011-pres. Principal Faculty, Harvard Stem Cell Institute, Harvard University, Boston, MA.
2011-2017 Assistant Professor, Center for Regenerative Medicine, Department of Psychiatry, Massachusetts General Hospital, Harvard Medical School, Boston, MA
2009-11 F1000 Associate Faculty Member
2004-pres. Society for Neuroscience
2004-pres. Molecular and Cellular Cognition Society
2004-2011 Postdoctoral Fellow, Neuroscience & Psychiatry, Columbia University, New York, NY.

Honors

2024- Mentor for Shenoy Undergraduate Research Fellowship in Neuroscience
2023 Honorary Master's Degree from Harvard university
2019-2024 James and Audrey Foster MGH Research Scholar

2018-2021	Alzheimer's Association International Research Grant - New to the Field Program
2017-2019	NARSAD Independent Investigator Award
2017-2019	Harvard Stem Cell Institute seed grant
2016	Harvard Neurodiscovery Center/MADRC Center Pilot Grant Award
2016	Harvard Hoopes prize (co-mentor of senior thesis with Dr. Arthur Kleinman)
2015	Harvard Stem Cell Institute Development Grant
2014	Inscopix DECODE Grant
2013	National Academy of Science Kavli Frontiers Fellow
2012-2016	Ellison New Scholar Award in Aging
2012-2015	Whitehall Foundation Grant
2011	NCDEU New Investigator Award (American Society of Clinical Psychopharmacology)
2011	SFN (Society for Neuroscience) Janett Rosenberg Trubatch Career Development Award
2010	Roche Translational Neuroscience Symposium Travel Award (cancelled)
2010	ACNP (American College of Neuropsychopharmacology) Early Career Travel Award
2009	Society for Neuroscience 3rd Annual Julius Axelrod Lecture Travel Award
2009	NIH Pathway to Independence Award (K99/R00)
2008-2010	Sackler Institute of Columbia University Award
2008-2010	NARSAD Young Investigator Award
2006-2008	NARSAD Young Investigator Award
2006	Health Emotions Research Institute Symposium Fellow, University of Wisconsin
2002	First prize, Graduate Student Association Poster competition-4th year category, Johns Hopkins University School of Medicine, Baltimore, MD
1995	Bennington College Career Center Grant for research
1995	Summer Undergraduate Research Fellowship, Rockefeller University

Mentoring

Catalyzing discovery science through empowering trainees

I am committed to mentoring trainees at all career stages-undergraduates, graduates and postdoctoral trainees. I have mentored numerous undergraduates who have performed senior honors thesis research (including a recipient of the Hoopes Prize, Harvard's highest honor for outstanding senior thesis), co-authored high-impact publications and gone onto attend prominent medical, graduate and MSTP programs. My laboratory's multi-stakeholder mentoring style has been profiled by the Harvard Stem Cell Institute and is routinely recognized in thesis critiques. Last year, I established a Curiosity Scholar fund through philanthropic support for a 12-week internship for college seniors majoring in computer science and neuroscience. My lab was selected as part of the first nation-wide cohort by the SIMONS foundation Autism and Neuroscience division to mentor non-neuroscience undergraduates.

Postdoctoral trainees have won numerous postdoctoral fellowships including K99/R00 and 3 NARSAD young Investigator Awards. Several graduate and postdoctoral trainees have transitioned into postdoctoral and independent Faculty/Assistant Professorship (3 and one currently interviewing at multiple schools) and industry positions. Since HMS is a very large and distributed ecosystem, I wanted to build a local circuit neuroscience community for fostering interactions between trainees at MGH and Mass Eye and Ear. I pitched and secured funding from the Harvard Brain Science Initiative (HBI) for a trainee led monthly seminar series which is now in its 6th year and is a poster child for successful inter-institutional trainee collaboration at HMS.

Outside of my primary basic neuroscience engagements, I participate in the MGH/McLean research track residency program and HMS Clinical and Translational Research Academy that recruit and train psychiatry residents. I provide R01 level grant writing mentorship to Assistant professors at MGH. Although salary support is not provided for teaching by MGH, I elected to teach because it is a powerful vehicle of inspiration for trainees. I co-directed the Harvard BBS Program graduate level stem cell course, Concepts in Development, Self-renewal and Repair CB226, for five consecutive years (2014-2018) at MGH. I give lectures to undergraduates, graduate student and medical residents as part of courses on Regeneration, Neuroscience and Psychiatry at Harvard University, Harvard Medical School and MGH. I teach the neuroscience section of the Leder Human Biology and Translational Medicine Program to Harvard and MIT graduate students at HMS.

Intellectual property

1. Molecular re-engineering of excitation-inhibition balance in memory circuits
PCT/US2015/020540
2. Vectors and Methods for treatment of neurodegeneration, delaying cognitive decline and improving memory
PCT 18/852,568 (US), PCT 23781809.1 (EPO)
3. Gene therapy Platform to restore GABAergic inhibition and improve cognition
PCT/US2025/047606

Publications

1. Giger RJ, Cloutier JF*, **Sahay A***, Prinjha RK*, Levengood DV, Moore SE, Pickering S, Simmons D, Rastan S, Walsh FS, Kolodkin AL, Ginty DD, Geppert M. Neuropilin-2 is required in vivo for selective axon guidance responses to secreted semaphorins. **Neuron**. 2000 Jan;25(1):29-41. PMID:10707970. (* equal contribution)
2. **Sahay A**, Molliver ME, Ginty DD, Kolodkin AL. Semaphorin 3F is critical for development of limbic system circuitry and is required in neurons for selective CNS axon guidance events. **The Journal of Neuroscience**. 2003; 23(17): 6671-6680. PMID: 12890759.
3. Cloutier JF*, **Sahay A***, Chang EC, Tessier-Lavigne M, Dulac C, Kolodkin AL, Ginty DD. Distinct requirements for Semaphorin 3F and Slit-1 in axonal targeting, fasciculation and segregation of olfactory receptor sensory neuron projections. **The Journal of Neuroscience**. 2004; 24(41): 9087-9096. PMID: 15483127. (* equal contribution)
4. **Sahay A***, Kim CH*, Sepkuty JP, Cho E, Huganir RL, Ginty DD, Kolodkin AL. Secreted semaphorins modulate synaptic transmission in the adult hippocampus. **The Journal of Neuroscience**. 2005; 25(14): 3613-3620. PMID:15814792. (* equal contribution)
5. Scobie KN, Hall BJ, Wilke SA, Klemenhagen KC, Fujii-Kuriyama Y, Ghosh A, Hen R, **Sahay A**. Krüppel-like factor 9 (Klf-9) is necessary for late-phase neuronal maturation in the developing dentate gyrus and during adult hippocampal neurogenesis. **The Journal of Neuroscience**. 2009; 29(31): 9875-9887. PMC2753873.
6. Weber T, Baier V, Pauly R, **Sahay A**, Baur M, Herrmann E, Ciccolini F, Hen R, Kronenberg G, Bartsch D. Inducible gene expression in GFAP+ progenitor cells of the SGZ and the dorsal wall of the SVZ– a novel tool to manipulate and trace adult neurogenesis. **Glia.** 2011; 59(4):615-626. PMID: 21294160.
7. **Sahay A***, Scobie KN, Hill AS, O'Carroll CM, Kheirbek MA, Burghardt NS, Fenton AA, Dranovsky A, Hen R*. Increasing adult hippocampal neurogenesis is sufficient to improve pattern separation. **Nature**. 2011; 472 (7344): 466-470. PMC3084370. *Co-corresponding author.

- "New Neurons, New Opportunities", Leading Edge, Learning & Memory, Cell 145, May 13, 2011
- Research Highlights, Nature Reviews Neuroscience, Volume 12, June 2011
- "New strategy for stimulating neurogenesis may lead to drugs to improve cognition and mood", Eurekalert
- "More Young Neurons Equals Better Brain Function", Massachusetts Alzheimer's Disease Research Center
- "Engineered Mice Make Better Choices", MIT Technology Review, April 6, 2011
- "Nurturing newborn neurons sharpens minds in mice Also lifts mood when combined with exercise- NIH-funded study", NIH Press Release, April 3, 2011
- Cited > 2000 times

8. Tata PR, Mou H, Pardo-Saganta A, Zhao R, Prabhu M, Law BM, Vinarsky V, Cho JL, Breton S, **Sahay A**, Medoff BD, Rajagopal J. Dedifferentiation of committed luminal epithelial cells into functional stem cells in vivo. **Nature**. 2013; 503(7475):218-223. PMC4035230.
9. Ikrar T, Guo N, He K, Besnard A, Levinson S, Hill A, Lee HK, Hen R, Xu X, **Sahay A**. Adult neurogenesis modifies excitability of the dentate gyrus. **Frontiers in Neural Circuits**. 2013;7:204. PMC3872742.
10. Hill AS, **Sahay A***, Hen R*. Increasing adult hippocampal neurogenesis is sufficient to reduce anxiety and depression-like behaviors. Neuropsychopharmacology. 2015; 40(10):2368-2378. PMC4538351. * Co-corresponding author.
11. McAvoy K, Russo C, Kim S, Rankin G, **Sahay A**. Fluoxetine induces input-specific dendritic spine remodeling in adulthood and middle age. **Hippocampus**. 2015; 25(11):1429-1446. PMC4596739.
12. McAvoy K, Scobie KN, Berger S, Russo C, Guo N, Decharatanachart P, Miake-LyeS , Whalen M, Nelson M, Bergami M, Bartsch D, Hen R, Berninger B, **Sahay A**. Modulating neuronal competition dynamics in the dentate gyrus to rejuvenate aging memory circuits. **Neuron**. 2016; 91(6):1356-1373.

- "Encouraging Integration". Research Highlights in Nature Reviews Neuroscience, Volume 17, November, 2016.

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- “Making memories stronger and more precise during aging”. EurekAlert, 1 September 2016.
- “Identifying mechanisms that may keep memories sharp in the aging brain”. Newsroom, NIA

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14. Raam T, McAvoy K, Besnard A, Veenema A, Sahay A. Hippocampal oxytocin receptors are necessary for discrimination of social stimuli **Nature Communications**. 2017. 8(1):2001.

- HMS News and research. Study reveals an oxytocin-fueled brain circuit that regulates social recognition https://hms.harvard.edu/news/social-memory
- Boston Globe Dec 14, 2017. How the brain distinguishes friends from strangers

15. Culig L, Surget A, Bourdey M, Khemissi W, Le Guisquet AM, Vogel E, **Sahay A**, Hen R, Belzung C.Increasing adult hippocampal neurogenesis in mice after exposure to unpredictable chronic mild stress may counteract some of the effects of stress. **Neuropharmacology** 2017; 126:179-189

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- News and Views in Nature Medicine
- “Switch” that could improve memory identified, The Harvard Gazette
- Investigators identify neural circuit genetic “switch” that maintains memory precision, EurekAlert 12 March 2018.
- NIH Director discussed this paper in his monthly blog on advances in sciences and medicine https://directorsblog.nih.gov/2018/05/24/unlocking-the-brains-memory-retrieval-system/

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- HMS News and research. Blocking key protein prevents impact of stress on neurons and alters fear response in mice. https://hms.harvard.edu/news/silencing-stress

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- Massachusetts General study identifies brain cells that modulate behavioral response to threats https://www.eurekalert.org/pub_releases/2019-02/mgh-mgs021119.php
- Threat sensors: the neurons that regulate fear response https://hsci.harvard.edu/news/threat-sensors

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25. Twarkowski H, Steininger V, Kim MJ, and **Sahay A**. A dentate gyrus-CA3 inhibitory circuit promotes evolution of hippocampal-cortical ensembles during memory consolidation. **eLife** 2022 11:e70586

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29. Chung A, Alipio JB, Ghosh M, Evans L, Miller SM, Goode TD, Mehta I, Ahmed OJ, **Sahay A**. Neotenic expansion of adult-born dentate granule cells reconfigures GABAergic inhibition to enhance social memory consolidation. Research Square 2025 (**in revision, Nature Neuroscience**)

30. Shih YT, Alipio JB, Klaft ZJ, Green N, Wong LP, Sadreyev R, Hyun JH, Dulla C, **Sahay A**.Pro-cognitive restoration of experience-dependent parvalbumin inhibitory neuron plasticity in neurodevelopmental disorders (In Press**, Nature,** 2026)

Reviews and Perspectives

31.**Sahay A***, Hen R*. The role of adult hippocampal neurogenesis in depression. Focus on Emotion and Disorders of Emotion issue. **Nature Neuroscience**. 2007; 10(9):1110-1115. Review. PMID:17726477. *Co-corresponding author.

32.**Sahay A**, Wilson DA, Hen R. Pattern separation: A common function for new neurons in hippocampus and olfactory Bulb. **Neuron**. 2011; Special Issue: Reviews on stem cells and adult neurogenesis, 70(4):582-588. Review. PMC3109085.

33.Ho NF, Hooker JM, **Sahay A**, Holt DJ, Roffman JL. In vivo imaging of adult hippocampal neurogenesis: progress, pitfalls and promise. **Molecular Psychiatry**. 2013; 18(4):404-416. Review. PMC3711219.

34.Kheirbek MA, Klemenhagen KC, **Sahay A***, Hen R*. Neurogenesis and generalization: a new approach to stratify and treat anxiety disorders. Nature Neuroscience. 2012; 15(12):1613-1620. Review. PMC3638121. *Co-corresponding author

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38.McAvoy K, Sahay A. Targeting adult neurogenesis to optimize hippocampal circuits in aging. **Neurotherapeutics**. 2017;

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40. Miller, S.M, **Sahay, A**. Functions of adult-born neurons in hippocampal memory interference and indexing. **Nature Neuroscience**. 2019 22(10): 1565-1575

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42. Goode, TD, Tanaka K, **Sahay A***, and McHugh TJ*. Integrated Index: Engrams, Place Cells, and Hippocampal Memory. **Neuron** 2020 107(5):805-820 *Co-corresponding author

43. Mohapatra, AN, and **Sahay A*.** Parvalbumin interneuron cell state plasticity in cognition and neurodevelopmental disorders. In Review, **Nature Neuroscience**