

Vishnu Dileep, Ph.D.
Postdoctoral Fellow (NIH K99)

Picower Institute for Learning and Memory
Massachusetts Institute of Technology
43 Vassar St., Cambridge, MA 02139
Email: vdileep@mit.edu Web: www.vishnudileep.com

Education and Major Research Training

- 2018 – **Postdoctoral Fellow**
Massachusetts Institute of Technology, Cambridge, MA, USA
The Picower Institute for Learning and Memory
Advisor: Prof. Li-Huei Tsai
Genome organization in neurodegeneration
- 2010 – 2017 **Ph.D. in Cell and Molecular Biology**
Florida State University, Tallahassee, FL, USA
Advisor: Prof. David M. Gilbert
Role of 3D genome organization in DNA replication timing
- 2006 – 2010 **B.Tech in Biotechnology**
Vellore Institute of Technology, Vellore, TN, India

Fellowships, Awards, and Honors

- 2021 – The NIH Pathway to Independence Award (K99/R00)
- 2019 – 2021 Alzheimer's Association Postdoctoral Research Fellowship
- 2016 Nominated for university-wide Outstanding Teaching Assistant Award, FSU
- 2015 Faculty Graduate Publications Award, FSU Biology Dept.
- 2015 Margaret Menzel Alumni Endowed Scholarship, FSU Biology Dept.
- 2013 – 2015 American Heart Association Pre-Doctoral Fellowship
- 2009 International Research Student Fellowship, University of Western Australia

Publications

Full Bibliography: <https://scholar.google.com/citations?user=250qpw4AAAAJ&hl=en>

First-author publications

† Co-corresponding, * Co-first authorship

- 1) **Dileep V** †*, Boix CA*, Mathys H, Marco A, Welch GM, Meharena HS, Loon A, Jeloka R, Peng Z, Bennett DA, Kellis M†, Tsai LH†. Neuronal DNA double-strand breaks lead to genome structural variations and 3D genome disruption in neurodegeneration. *Cell* (2023) [PDF]
- 2) **Dileep V**, Tsai LH. Neuronal enhancers get a break. *Neuron* (2021) (Opinion Article) [PDF]
- 3) **Dileep V**, Tsai LH. Three-dimensional chromatin organization in brain function and dysfunction. *Current Opinion in Neurobiology* (2021) (Review Article) [PDF]
- 4) **Dileep V***, Wilson K*, Marchal C, Lyu X, Zhao PA, Li B, Axel P, Bartlett DA, Qin Z, Robins AJ, Schulz TC, Kulik KJ, Dalton S, Corces VG, Gilbert DM. Rapid lineage determination of human embryonic stem cells is accompanied by discordant changes in replication timing and chromatin compartment. *Stem Cell Reports* (2019) [PDF]

- 5) Dixon J[†], Xu J*, **Dileep V***, Zhan Y*, Song F*, Le VT, Yardimci GG, Chakraborty A, Bann DV, Wang Y, Clark R, Zhang L, Yang H, Liu T, Iyyanki S, An L, Pool C, Sasaki T, Rivera-Mulia JC, ..., Ay F[†], Noble WS[†], Dekker J[†], Gilbert DM[†], Yue F[†]. Integrative detection and analysis of structural variation in cancer genomes. *Nature Genetics* (2018) [[PDF](#)]
- 6) **Dileep V**, Gilbert DM. Single-cell replication profiling reveals stochastic regulation of the mammalian replication-timing program. *Nature Communication* (2018) [[PDF](#)]
- 7) **Dileep V**, Rivera-Mulia JC, Sima J, Gilbert DM. Large-Scale Chromatin Structure-Function Relationships during the Cell Cycle and Development: Insights from Replication Timing. *Cold Spring Harb Symp Quant Biol* (2015) (Review Article) [[PDF](#)]
- 8) **Dileep V**, Ay F, Sima J, Vera DL, Noble WS, Gilbert DM. Topologically-associating domains and their long-range contacts are established during early G1 coincident with the establishment of the replication timing program. *Genome Research* (2015) [[PDF](#)]
- 9) **Dileep V**, Didier R, Gilbert DM. Genome-wide analysis of replication timing in mammalian cells: troubleshooting problems encountered when comparing different cell types. *Methods* (2012) [[PDF](#)]
- 10) **Dileep V**. The place and function of non-coding DNA in the evolution of variability. Hypothesis (2009) (Opinion Article) [[PDF](#)]

Co-Author Publications

- 11) Xiong X*, James BT*, Boix CA*, Park YP, Galani K, Victor MB, Sun N, Hou L, **Dileep V**, Ho L-L, Mantero J, Ni Scannail A, Mathys H, Bennett DA, Tsai LH[†], Kellis M[†]. Epigenomic dissection of Alzheimer's disease pinpoints causal variants and reveals epigenome erosion. *Cell* (2023) [[PDF](#)]
- 12) Penney J, Ralvenius WT, Loon AR, Cerit O, **Dileep V**, Milo M, Woolf H, Tsai LH. Distinct effects of disease-associated TREM2 R47H/+ and T66M mutations on iPSC-derived microglia. (Under revision).
- 13) Welch GM, Boix CA, Schmauch E, Davila-Velderrain J, Victor MB, **Dileep V**, Bozzelli PL, Su Q, Cheng JD, Lee A, Leary NS, Pfenning AR, Kellis M, Tsai LH. Neurons burdened by DNA double-strand breaks incite microglia activation through antiviral-like signaling in neurodegeneration. *Science Advances* (2022) [[PDF](#)]
- 14) Meharena HS, Marco A, **Dileep V**, Lockshin ER, Akatsu GY, Mullahoo J, Watson LA, Ko T, Guerin LN, Abdurrob F, Rengarajan S, Papanastasiou M, Jaffe JD, Tsai LH. Down-syndrome-induced senescence disrupts the nuclear architecture of neural progenitors. *Cell Stem Cell* (2022) [[PDF](#)]
- 15) Bartlett DA, **Dileep V**, Baslan T, Gilbert DM. Mapping Replication Timing in Single Mammalian Cells. *Current Protocols* (2022) [[PDF](#)]
- 16) Bartlett DA, **Dileep V**, Handa T, Ohkawa Y, Kimura H, Henikoff S, Gilbert DM. High-throughput single-cell epigenomic profiling by targeted insertion of promoters (TIP-seq). *Journal of Cell Biology* (2021) [[PDF](#)]
- 17) Marco A, Meharena HS, **Dileep V**, Raju RM, Davila-Velderrain J, Zhang AL, Adaikkan C, Young JZ, Gao F, Kellis M, Tsai LH. Mapping the epigenomic and transcriptomic interplay during memory formation and recall in the hippocampal engram ensemble. *Nature Neuroscience* (2020) [[PDF](#)]
- 18) Zhang J, Lee D, Dhiman V,....., **Dileep V**,....., Gerstein M. An integrative ENCODE resource for cancer genomics. *Nature Communication* (2020) [[PDF](#)]

- 19) ENCODE Project Consortium, Moore JE, Purcaro MJ, et al. Expanded encyclopaedias of DNA elements in the human and mouse genomes. *Nature* (2020) [[PDF](#)]
- 20) Sima J, Chakraborty A, **Dileep V**, Michalski M, Rivera-Mulia JC, Trevilla-Garcia C, Klein KN, Bartlett D, Washburn BK, Paulsen MT, Vera D, Nora EP, Kraft K, Mundlos S, Bruneau BG, Ljungman M, Fraser P, Ay F, Gilbert DM. Identifying cis Elements for Spatiotemporal Control of Mammalian DNA Replication. *Cell* (2019) [[PDF](#)]
- 21) Foti R, Gnan S, Cornacchia D, **Dileep V**, Bulut-Karslioglu A, Diehl S, Bunes A, Klein FA, Huber W, Johnstone E, Loos R, Bertone P, Gilbert DM, Manke T, Jenuwein T, Bonomo SC. Nuclear Architecture Organized by Rif1 Underpins the Replication-Timing Program. *Molecular Cell* (2016) [[PDF](#)]
- 22) Pope BD*, Ryba T*, **Dileep V**, Yue F, Wu W, Denas O, Vera DL, Wang Y, Hansen RS, Canfield TK, Thurman RE, Cheng Y, Gülsoy G, Dennis JH, Snyder MP, Stamatoyannopoulos JA, Taylor J, Hardison RC, Kahveci T, Ren B, Gilbert DM. Topologically associating domains are stable units of replication-timing regulation. *Nature* (2014) [[PDF](#)]
- 23) Takebayashi S, Lei I, Ryba T, Sasaki T, **Dileep V**, Battaglia D, Gao X, Fang P, Fan Y, Esteban MA, Tang J, Crabtree GR, Wang Z, Gilbert DM. Murine esBAF chromatin remodeling complex subunits BAF250a and Brg1 are necessary to maintain and reprogram pluripotency-specific replication timing of select replication domains. *Epigenetics & Chromatin* (2013) [[PDF](#)]
- 24) Cornacchia D, **Dileep V**, Quivy JP, Foti R, Tili F, Santarella-Mellwig R, Antony C, Almouzni G, Gilbert DM, Bonomo SB. Mouse Rif1 is a key regulator of the replication-timing programme in mammalian cells. *EMBO Journal* (2012) [[PDF](#)]
- 25) Takebayashi S, **Dileep V**, Ryba T, Dennis JH, Gilbert DM. Chromatin-interaction compartment switch at developmentally regulated chromosomal domains reveals an unusual principle of chromatin folding. *PNAS* (2012) [[PDF](#)]

Oral Presentations

May 2022	CSHL Conference on Genome Organization & Nuclear Function Cold Spring Harbor, NY
Feb 2016	Department of Biological Science Colloquium , FSU, Tallahassee, FL
Aug 2014	CSHL Conference on Dynamic Organization of Nuclear Function Cold Spring Harbor, NY
Sep 2012	CSHL Conference on Dynamic Organization of Nuclear Function Cold Spring Harbor, NY

Selected Poster Presentations

Jun 2022	Cold Spring Harbor 86th Symposium: Genome Stability & Integrity Cold Spring Harbor, NY
Jul 2021	Alzheimer's Association International Conference , Denver, CO
Nov 2016	NCI Symposium on Chromosome Biology , National Cancer Institute Bethesda, MA
Oct 2016	4D Nucleome 2016 Annual Meeting , San Diego, CA
Mar 2016	NIH Single Cell Analysis Program Investigators Meeting , Bethesda, MA
Oct 2014	The CMB Graduate Student Association Symposium , Tallahassee, FL

Teaching

- Apr 2021 – Guest lecturer for the Neuroepigenetics section in the Molecular Cellular Neuroscience Core II - 7.68J/9.013J course at MIT
- Nov 2019 Teaching workshop (Picower Institute, MIT)
- Aug 2010 – Jul 2013 Teaching Assistant for the following courses at Florida State University.
- Prokaryotic Lab (MCB4403L)
 - Experimental Biology Lab (BSC3402L)
 - Animal Development (PCB4253)
 - Biological Science I Laboratory (BSC2010L)
- Aug 2010 FSU 5-day teaching workshop

Mentorship and Outreach

- 2023 – Member of *Skype a Scientist* Organization
- Mar 2021 – Mentorship of one student with the **Undergraduate Research Opportunities Program at MIT (UROP)**. UROP gives undergraduate students the opportunity to collaborate on and contribute to hands-on research across MIT.
- Jul 2019 – Mentorship of two technical associates to study the role of DNA double-strand breaks in neurodegeneration.
- Jun 2021 – Aug 2022 Mentorship of one student with the **MIT Summer Research Program (MSRP)**. MSRP began in 1986 as an MIT institutional effort to address the issue of underrepresentation of African Americans, Mexican Americans, Native Americans, and Puerto Ricans in engineering and science in the United States. The goal of MSRP is to increase the number of underrepresented minorities and underserved students in the research enterprise.
- Oct 2018 Mentorship of one graduate rotation student in the Tsai lab at MIT
- 2013 – 2014 Mentorship of two graduate rotation students in the Gilbert lab at FSU

Other Academic Services and Professional Activities

- 2023 – **Review editor** for Frontiers in Genetics, Epigenomics and Epigenetics section.
- 2023 – **Member** of the American Society for Human Genetics (ASHG).
- 2021 – 2023 **Guest editor** for Frontiers in Cell and Developmental Biology, Special issue on Deregulations in Chromatin Topology, Transcription, and Epigenetics.
- 2020 **MIT Venture Exploration Program**. 6-week, virtual program that allows you to develop a business model for your research-derived product or service.
- 2019 – **Ad-hoc independent peer reviewer** for the following journals: Nature Communication Biology, eLife, PLOS Computational Biology, Nucleic Acid Research, International Journal of Molecular Sciences, Genes, Cells.
- 2015 Contributed a figure in the textbook **Lewin's Genes XII** on the structure-function relationship between chromatin 3D organization and DNA replication timing (Figure 7.13, pg. 172).

2012

Organizing committee member for the SouthEast Stem Cell Consortium Conference, FSU.

Research Support

- Jul /2021 – (Active) **NIH Pathway to Independence Award** (PI: Vishnu Dileep)
Postdoctoral Phase - \$136,674 per year for 2 years
Faculty Phase - \$249,000 per year for 3 years
- Apr 2019 – Mar 2021 (Completed) **Alzheimer’s Association Research Fellowship** (PI: Vishnu Dileep)
\$140,000 for 2 years
- Jul 2013 – Jun 2015 (Completed) **American Heart Association Pre-doctoral Fellowship** (PI: Vishnu Dileep)
\$52,000 for 2 years

Additional Research Experience

- Feb 2010 – May 2010 **Undergraduate Research Student**
University of Western Australia, Perth, Australia
Research topic: Investigating the effects of vitamin D on myotube size and Akt signaling using skeletal muscle cell culture.
Research Advisor: Prof. Miranda Grounds
- May 2008 – Jun 2008 **Summer Research Student**
Rajiv Gandhi Center for Biotechnology, Trivandrum, India
Research topic: Deciphering the changes in the Autoimmune Regulator (AIRE) gene in Polycystic Ovarian Syndrome.
Research Advisor: Dr. Malini Laloraya
- 2007 – 2009 **Undergraduate Research Student**
VIT University, Vellore, India
Research topic: Methods for improving DNA isolation from complex environmental samples.
Research Advisor: Prof. Kalaichelvan Gurumurthy