Karthik Shekhar - Curriculum Vitae

Dept. of Chemical and Biomolecular Engineering
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EDUCATIONAL BACKGROUND

Ph.D. in Chemical Engineering September 2008 - May 2014
Massachusetts Institute of Technology
Degree Date: 02/15/2015
Thesis: Dimensionality Reduction in Immunology: From Viruses to Cells

Dual Degree (B.Tech + M. Tech) in Chemical Engineering August 2003 - May 2008
Indian Institute of Technology, Bombay
Degree Date: 07/01/2008

PROFESSIONAL APPOINTMENTS

- **Assistant Professor** January 2020 - Present
  Chemical and Biomolecular Engineering
  Cross-Affiliations: Neuroscience, Biophysics, Computational Biology, Vision Science
  University of California, Berkeley
- **Faculty Scientist** August 2021 - Present
  Biological Systems and Engineering Division
  Lawrence Berkeley National Laboratory, Berkeley
- **Postdoctoral Fellow** October 2014 - December 2019
  Broad Institute of MIT and Harvard

HONORS AND AWARDS

- McKnight Scholar 2023-2025
- The Donald Sterling Noyce Prize for Excellence in Undergraduate Teaching, UC Berkeley 2023
- Teaching Award, Chemical and Biomolecular Engineering, UC Berkeley 2023
- Scialog Fellow (Microbiome, Neurobiology and Disease) 2023
- National Glaucoma Research Douglas H. Johnson Award 2023
- Member, Next Generation Leaders Council, Allen Institute 2022-2025
- Fellow, Glaucoma Research Foundation CFC4 2022
- Society of Hellman Fellow 2022
- Teaching Award, Chemical and Biomolecular Engineering, UC Berkeley 2022
- Finalist for the Rita Allen Foundation Scholars Program 2022
- NIH Pathway to Independence Award (K99/R00) March 2018-March 2023

- Outstanding Graduate Teaching Assistant, MIT Chemical Engineering 2013
- Best Graduate Student Seminar, MIT Chemcal Engineering 2013
- Poitras pre-doctoral fellowship for Biomedical Research, MIT 2011
- Jerry & Geraldine S. McAfee Fellowship, MIT 2009
- Institute Silver Medal, IIT Bombay 2008
- Manudhane Award for Best Thesis, IIT Bombay 2008

PAPERS AND PREPRINTS

Refs 22-33 published during Berkeley. 34 is a preprint, and 35-41 are under preparation and will be submitted/published in 2024.

*equal contributions, ‡ **indicate publications as corresponding author**

34. Hellevik A. M., Mardoum P., Hahn, J., Kölsch, Y., D'Orazi, F., Suzuki, S., Godinho, L., Lawrence, O., **Shekhar, K.**, Sanes, J.R., Baier, H., Baden, T., Wong, R.O., and Yoshimatsu, T., Ancient origin of the rod bipolar cell pathway in the vertebrate retina, *submitted*, *bioRxiv* (2023)
33. Hahn, J., Monavarfeshani, A., Qiao, M., Kao, A., Kolsch, Y., ..., Peng. Y, Sanes, J.R.‡, and **Shekhar K.**‡, Evolution of neuronal cell classes and types in the vertebrate retina. bioRxiv, (2023) (*Nature*, in press)
32. Benhar I., Ding J., Whitney I.E., Yan W., Jacobi A., Sud M., Burgin G., **Shekhar K.**, Tran N.M., Wang C., He Z., Sanes J.R. and Regev A., Single cell profiling of non-neuronal retinal cells reveals dynamic multicellular responses to central nervous system injury, *Nature Immunology*, (2023)
31. Whitney I.*, Butrus S.*,Dyer M. ,Rieke F., Sanes J.R.‡ and **Shekhar K.**‡, Vision-dependent and -independent molecular maturation of mouse retinal ganglion cells, *Neuroscience*, 508:153-73., (2023)
30. Goetz, J., Jessen, Z., Jacobi, A., Mani, A., Cooler, S., Greer, D., Kadri, S., Segal, J., **Shekhar K.**, Sanes, J.R. and Schwartz, G.W., Unified classification of mouse retinal ganglion cells using function, morphology, and gene expression. *Cell Reports*, 40(2), pp.111040 (2022)
29. Wareham L. et al., Solving neurodegeneration: common mechanisms and strategies for new treatments, *Molecular Neurodegeneration*, 17(1), pp. 1-29, (2022)
28. **Shekhar K.**‡, Whitney I., Butrus S., Peng Y.R., and Sanes, J.R.‡, Diversification of multipotential postmitotic mouse retinal ganglion cell precursors into discrete types, *eLife*,11, p.e73809 (2022)
27. Cheng S.*, Butrus S.*, Xu V., Sagireddy S., Tan L., **Shekhar K.**‡, and Zipursky S.L.‡, Vision is required for cell type specification in the visual cortex, *Cell*, 185(2), pp.311-327 (2022)
    - *News and Views*: Puiggros S. and Jabaudon D., Light-dependent development is tailored in visual neurons, *Nature*, (2022)
    - *Press*: Research shines a light on development of the visual cortex during the critical period after birth
26. Beyaz, S., Roper, J., Xifaras, M.E., Bauer-Rowe, K.E., Ergin, I., Dohnalova, L., Biton, M., **Shekhar K.**, Mou, H., Eskiocak, O. and Ozata, D.M., et al. Dietary suppression of MHC-II expression in intestinal stem cells enhances intestinal tumorigenesis. *Cell Stem Cell*, 28(11), pp. 1922-35, (2021)

25. **Shekhar K.**‡ and Sanes, J. R.‡, Generating and using transcriptomically based retinal cell atlases., *Annual Review of Vision Science*, 7, (2021)

24. Kölsch, Y., Hahn, J., Sappington, A., Stemmer, M., Fernandes, A.M., Helmbrecht, T.O., Lele, S., Butrus, S., Laurell, E., Arnold-Ammer, I., **Shekhar K.**‡, Sanes, J.R.‡, and Baier, H.‡, Molecular classification of zebrafish retinal ganglion cells links genes to cell types to behavior. *Neuron*, 109(4), pp.645-662, (2021)

23. Yan, W.*, Peng, Y.R.*, van Zyl, T.* et al. Cell Atlas of the Human Fovea and Peripheral Retina. *Scientific Reports*, `https://doi.org/10.1101/2020.02.11.943779` (2020)

22. van Zyl, T.*, Yan, W.*, McAdams, A., Peng, Y.R.,**Shekhar K.**, Regev, A., Juric, D. and Sanes, J.R.‡, Cell atlas of aqueous humor outflow pathways in eyes of humans and four model species provides insight into glaucoma pathogenesis. *Proceedings of the National Academy of Sciences*, 117(19), pp.10339-10349, (2020).

21. Tran, N.M.*, **Shekhar, K.***, Whitney, I.E.*, Jacobi, A.*, Benhar, I., Hong, G., Yan, W., Adiconis, X., Arnold, M.E., Lee, J.M., Levin, J.Z. et al., Single-cell profiles of retinal ganglion cells differing in resilience to injury reveal neuroprotective genes. *Neuron*, 104(6), pp.1039-1055, (2019).

20. Peng, Y.R.*, **Shekhar, K.***, Yan, W., Herrmann, D., Sappington, A., Bryman, G.S., van Zyl, T., Do, M.T.H., Regev, A. and Sanes, J.R.‡, Molecular classification and comparative taxonomics of foveal and peripheral cells in primate retina. *Cell*, 176(5), pp.1222-1237 (2019).

19. Moffitt, J.R.*, Bambah-Mukku, D.*, Eichhorn, S.W., Vaughn, E., **Shekhar, K.**, Perez, J.D., Rubinstein, N.D., Hao, J., Regev, A., Dulac, C.‡ and Zhuang, X.‡, Molecular, spatial, and functional single-cell profiling of the hypothalamic preoptic region. *Science*, 362(6416), (2018).

18. Biton, M.*, Haber, A.L.*, Rogel, N., Burgin, G., Beyaz, S., Schnell, A., Ashenberg, O., Su, C.W., Smillie, C., **Shekhar, K.**, Chen, Z. et al., T helper cell cytokines modulate intestinal stem cell renewal and differentiation. *Cell*, 175(5), pp.1307-1320, (2018).

17. Farrell, J.A.*, Wang, Y.*, Riesenfeld, S.J., **Shekhar, K.**, Regev, A.‡ and Schier, A.F.‡, Single-cell reconstruction of developmental trajectories during zebrafish embryogenesis. *Science*, 360(6392), (2018).

16. Pandey, S., **Shekhar, K.**, Regev, A. and Schier, A.F.‡, Comprehensive identification and spatial mapping of habenular neuronal types using single-cell RNA-seq. *Current Biology*, 28(7), pp.1052-1065, (2018).

15. Haber, A.L.*, Biton, M.*, Rogel, N.*, Herbst, R.H., **Shekhar, K.**, Smillie, C., Burgin, G., Delorey, T.M., Howitt, M.R., Katz, Y., Tirosh, I. et al., A single-cell survey of the small intestinal epithelium. *Nature*, 551(7680), pp.333-339. (2017).

14. Habib, N.*, Avraham-Davidi, I.*, Basu, A.*, Burks, T., **Shekhar, K.**, Hofree, M., Choudhury, S.R., Aguet, F., Gelfand, E., Ardlie, K., Weitz, D.A. et al., Massively parallel single-nucleus RNA-seq with DroNc-seq. *Nature Methods*, 14(10), pp.955-958., (2017).

13. Kaczorowski, K.J., **Shekhar, K.**, Nkulikiyimfura, D., Dekker, C.L., Maecker, H., Davis, M.M.‡, Chakraborty, A.K.‡ and Brodin, P.‡, Continuous immunotypes describe human immune variation and predict diverse responses. *Proceedings of the National Academy of Sciences*, 114(30), pp.E6097-E6106, (2017).

12. Villani, A.C.*, Satija, R.*, Reynolds, G., Sarkizova, S., **Shekhar, K.**, Fletcher, J., Griesbeck, M., Butler, A., Zheng, S., Lazo, S., Jardine, L. et al., Single-cell RNA-seq reveals new types of human blood dendritic cells, monocytes, and progenitors. *Science*, 356(6335), (2017).

11. Werley, C.A., Chien, M.P., Gaublomme, J., **Shekhar, K.**, Butty, V., Yi, B.A., Kralj, J.M., Bloxham, W., Boyer, L.A., Regev, A. and Cohen, A.E.‡, 2017. Geometry-dependent functional

changes in iPSC-derived cardiomyocytes probed by functional imaging and RNA sequencing. *PloS One*, 12(3), p.e0172671, (2017).

10. Stadinski, B.D., **Shekhar, K.**, Gómez-Touriño, I., Jung, J., Sasaki, K., Sewell, A.K., Peakman, M., Chakraborty, A.K. and Huseby, E.S.. Hydrophobic CDR3 residues promote the development of self-reactive T cells. *Nature Immunology*, 17(8), pp.946-955, (2016).

9. **Shekhar, K.***, Lapan, S.W.*, Whitney, I.E.*, Tran, N.M., Macosko, E.Z., Kowalczyk, M., Adiconis, X., Levin, J.Z., Nemesh, J. et al. Comprehensive classification of retinal bipolar neurons by single-cell transcriptomics. *Cell*, 166(5), pp.1308-1323, (2016).

8. Ndhlovu, Z.M., Kamya, P., Mewalal, N., Kløverpris, H.N., Nkosi, T., Pretorius, K., Laher, F., Ogunshola, F., Chopera, D., **Shekhar, K.** and Ghebremichael, M., Magnitude and kinetics of CD8+ T cell activation during hyperacute HIV infection impact viral set point. *Immunity*, 43(3), pp.591-604, (2015).

7. Macosko, E.Z., Basu, A., Satija, R., Nemesh, J., **Shekhar, K.**, Goldman, M., Tirosh, I., Bialas, A.R., Kamitaki, N., Martersteck, E.M., Trombetta, J.J. et al., Highly parallel genome-wide expression profiling of individual cells using nanoliter droplets. *Cell*, 161(5), pp.1202-1214, (2015).

6. Quadeer, A.A., Louie, R.H., **Shekhar, K.**, Chakraborty, A.K., Hsing, I.M. and McKay, M.R.‡, Statistical linkage analysis of substitutions in patient-derived sequences of genotype 1a hepatitis C virus nonstructural protein 3 exposes targets for immunogen design. *Journal of Virology*, 88(13), pp.7628-7644, (2014).

5. **Shekhar, K.***, Brodin, P.*, Davis, M.M.‡ and Chakraborty, A.K.‡, Automatic classification of cellular expression by nonlinear stochastic embedding (ACCENSE). *Proceedings of the National Academy of Sciences*, 111(1), pp.202-207, (2014)

4. Quadeer, A.A., Louie, R.H., **Shekhar, K.**, Chakraborty, A.K., Hsing, I. and McKay, M.R.‡, Discovering statistical vulnerabilities in highly mutable viruses: A random matrix approach. *2014 IEEE Workshop on Statistical Signal Processing (SSP) (pp. 5-8). IEEE*, (2014).

3. Barouch, D.H.‡, Whitney, J.B., Moldt, B., Klein, F., Oliveira, T.Y., Liu, J., Stephenson, K.E., Chang, H.W.,**Shekhar, K.**, Gupta, S., Nkolola, J.P. et al., Therapeutic efficacy of potent neutralizing HIV-1-specific monoclonal antibodies in SHIV-infected rhesus monkeys. *Nature*, 503(7475), pp.224-228, (2013).

2. **Shekhar, K.**, Ruberman, C.F., Ferguson, A.L., Barton, J.P., Kardar, M. and Chakraborty, A.K.‡, Spin models inferred from patient-derived viral sequence data faithfully describe HIV fitness landscapes. *Physical review E*, 88(6), p.062705, (2013).

1. Dahirel, V.*, **Shekhar, K.***, Pereyra, F., Miura, T., Artyomov, M., Talsania, S., Allen, T.M., Altfeld, M., Carrington, M., Irvine, D.J., Walker, B.D.‡ and Chakraborty, A.K.‡, Coordinate linkage of HIV evolution reveals regions of immunological vulnerability. *Proceedings of the National Academy of Sciences*, 108(28), pp.11530-11535, (2011).

BOOK CHAPTERS

1. Butrus, S.‡, Sagireddy, S., Yan, W. and Shekhar, K.‡, Defining selective neuronal resilience and identifying targets of neuroprotection and axon regeneration using single-cell RNA sequencing – computational approaches, In *Axon Regeneration: Methods and Protocols*, (pp. 19-41). New York, NY: Springer US, (2023).

2. Shekhar, K.‡ and Menon, V.‡, Identification of cell types from single-cell transcriptomic data. In *Computational Methods for Single-Cell Data Analysis* (pp. 45-77). Humana Press, New York, NY, (2019).

3. Villani, A.C.‡ and Shekhar, K.‡, Single-cell RNA sequencing of human T cells. In *T-Cell Differentiation* (pp. 203-239). Humana Press, New York, NY, (2017).

IN PREPARATION

*equal contributions, ‡ **indicate publications as corresponding author**

7. Row H.‡, Fernandes J.B.‡, Mandadapu K.K.‡, and **Shekhar K.‡**, "Spatiotemporal dynamics of diffuse charge near biological membranes", *in preparation* (2024)
6. Jain S., Butrus S., Yoo J., Zipursky S.L.‡, and **Shekhar K.‡**, "Multiomic analysis of visual cortical development", *in preparation* (2024)
5. Butrus S., Monday H., Feldman D.‡, and **Shekhar K.‡**, "The role of postnatal whisking in the development of the somatosensory barrel cortex", *in preparation* (2024)
4. Somaiya R.D., Po M., Feller M.B.‡, and **Shekhar K.‡**, "Weak dependence of spontaneous activity on retinal ganglion cell type development", *in preparation* (2024)
3. Hahn J., Donahue R., Sanes J. R. and **Shekhar K.‡**, A molecular atlas of Human Glaucoma, *in preparation* (2024)
2. Tsai N., Nimkar K., Lum M., Zhao M., **Shekhar K.‡**, and Duan X‡., Spatial transcriptomic mapping of retinal topographies, *in preparation* (2023)
1. Tomassini D., Hahn J., Monavarfeshani A., Sanes J. R.‡, and **Shekhar K.‡**, Ultraconserved evoltion of amacrine cell types in 20 vertebrate retinas, *in preparation* (2023)

PATENTS

1. Kuchroo VK, Wang C, Regev A, Shekhar K, Method of treating autoimmune disease with lymphocyte antigen CD5-like (CD5L) protein. United States patent US 11,001,622. (2021).
2. Haber, A., Biton, M., Herbst, R.H., Shekhar, K., Smillie, C., Rozenblatt-Rosen, O., Xavier, R., Regev, A., Ordovas-Montanes, J., Shalek, A.K. and Rogel, N., Modulation of intestinal epithelial cell differentiation, maintenance and/or function through t cell action. U.S. Patent Application 16/348,911, (2019).
3. Shekhar, K., Lapan, S., Whitney, I., Macosko, E., Mccarroll, S., Cepko, C., Regev, A. and Sanes, J., Harvard College, Massachusetts Institute of Technology and Broad Institute Inc, Method for determination and identification of cell signatures and cell markers. U.S. Patent Application 15/680,127, (2018).

PRESENTATIONS

64. Spatial transcriptomic analysis of cell type topographies in retinal whole mounts, *Oxyopia seminar*, Vision Science and Optometry, UC Berkeley (November 2023), **Invited Lecture**
63. Evolution of cell types in the vertebrate retina: Lessons from single-cell transcriptomics, *Department of Opthalmology*, Washington University St. Louis, (November 2023), **Student Invited Seminar**
62. Ways of seeing: What can single-cell genomics teach us about the evolution of cells encoding vision?, *Departmental Seminar, Chemical Engineering*, MIT, Boston MA (October 2023), **Invited Lecture**

61. Evolution of cell types in the vertebrate retina: Lessons from single-cell transcriptomics, *Berkeley Neuroscience Conference*, Lake Tahoe, CA USA (October 2023), **Invited Lecture**

60. Evolution of cell types in the vertebrate retina: Lessons from single-cell transcriptomics, *European Retina Meeting*, Tübingen, Germany, (September 2023), **Invited Lecture**

59. Single-cell genomics of the retina: Cell types, neurodegeneration, and evolution, *Glaucoma Research Foundation, Solving Neurodegeneration 2 Catalyst Meeting, Boston MA*, (August 2023), **Invited Lecture**

58. Comparative transcriptomics of retinal cell types, *Worldwide Neuroscience Seminar, Sussex Vision Series*, (July 2023), **Invited Lecture** (Video link)

57. Single-cell transcriptomic analysis of neural plasticity, *Single-cell biology: from development to cancer*, (June 2023, Keystone Symposium, Keystone CO), **Invited Lecture**

56. The conservation of human cell types in animal models, *ARVO SIG: Leveraging single cell data to improve ocular therapy outcomes*, (May 2023), **Invited Lecture**

55. Sequencing the Retinome: Diversification, Topography and Evolution , *S2C: Synapse to Circuit Seminar, UC Los Angeles*, (February 2023), **Invited Lecture**

54. Single-cell genomic analysis of neural diversity in the vertebrate visual system, *Center for Computational Biology Seminar, UC Berkeley*, (February 2023), **Invited Lecture**

53. Development and evolution of neural diversity in the visual system: a single-cell transcriptomics perspective, *Tata Institute of Fundamental Research (TIFR), Mumbai, India*, (January 2023), **Invited Lecture**

52. Evolution of cell types in the vertebrate retina, *Allen Institute Showcase Symposium, Seattle, WA*, (December 2022), **Invited Lecture**

51. Development of neuronal diversity in the visual system: single-cell genomic analysis, *Baylor College of Medicine Vision Symposium, Houston, TX*, (December 2022), **Invited Lecture**

50. Optimal transport analysis of retinal neuronal developmnt, *AIChE annual meeting, Phoenix AZ, Session: Big data and machine learning to advance medicine*, (November 2022), **Contributed Lecture**

49. Development and evolution of neural diversity in the visual system: a single-cell transcriptomics perspective, *Bioengineering department seminar, University of California, Berkeley*, (November 2022), **Invited Lecture**

48. Development and evolution of neural diversity in the visual system: a molecular perspective, *Redwood Center for Theoretical Neuroscience, Seminar*, (October 2022) **Invited Lecture**

47. Development and evolution of neural diversity in the visual system: a transcriptomics perspective, *Vision Science Annual Retreat, UC Berkeley*, (September 2022), **Invited Lecture**

46. Experience-dependent and -independent development of the visual system: A tale of two tissues, Gordon Research Conference on Visual System Development, (August 2022) **Invited Lecture**

45. Single-cell transcriptomics of the visual critical period, Gordon Research Conference on Neural Development, (August 2022) **Invited Lecture**

44. Single-cell analysis of retinal development and axon-regeneration, *FENS, Paris*, (July 2022) **Invited Lecture**

43. Tools for retinal neurobiologists: transcriptomics, *FASEB Retinal Neurobiology and Visual Processing, Southbridge MA*, (June 2022) **Invited Presentation**

42. Single-cell transcriptomic analysis of neural development, *Neuro2022, Okinawa, Japan, Session: Single-cell technologies in neuroscience*, (June 2022), **Invited Lecture**

41. Vision-dependent cell type specification in the visual cortex, *Cortical Development, Sicily*, (May 2022) **Invited Lecture**

40. What can single-cell transcriptomics teach us about neural development?, *QB3 Science Lunch, University of California, Berkeley*, (May 2022) **Invited Lecture**

39. Generating and using retinal cell atlases, *L.V. Prasad Eye Institute, Hyderabad, India* (April 2022) **Invited Lecture**

38. Single-cell approaches to understand tissues in health and disease, *ACTREC, Mumbai* (March 2022) **Invited Lecture**

37. How activity shapes neural transriptomes and connectomes, *Rita Allen Foundation.* (March 2022) **Invited Presentation**

36. Single-cell genomic analysis of nature and nurture in the brain, *Genentech Inc.* (December 2021) **Invited Lecture**

35. Experience-dependent neural development: from form to function, *AIChE Annual Meeting, Session in honor of Arup Chakraborty*, (November 2021) **Invited Lecture**

34. Single-cell transcriptomic analysis of postnatal cortical development, *UC Berkeley Neuroscience Retreat* (October 2021) **Invited Lecture**

33. Molecular patterning of cell types in the visual system, *Feller lab group meeting* (June 2021) **Invited presentation**

32. Not all RGCs are created equal: Single-cell transcriptomic analysis of selective neuronal vulnerability, *Solving neurodegeneration: Catalyst meeting*, Glaucoma Research Foundation (April 2021) **Invited Lecture**

31. Molecular Diversification of Neurons, *QB3 Science Lunch*, UC Berkeley (December 2020) **Invited Lecture**

30. Retinal cells in development and dysfunction, *Opthalmology Grand Rounds at Stanford Byers Eye Institute*, (November 2020) **Invited Lecture**

29. Single-cell transcriptomic dissection of selective vulnerability in the CNS, *Virtual Conference on Development and Regeneration in Neural Circuits: Common Themes and Important Differences, Society for Neuroscience*, (September 2020) **Invited Lecture**

28. Making and using a retinal cell atlas, *Workshop on recent advances in single-cell genomics, ASCB EMBO meeting, Washington D.C.*, (December 2019) **Invited Lecture**

27. Single-cell transcriptomic inference of the postmitotic diversification of 45 types of retinal ganglion cells, *Society for Neuroscience Annual Meeting*, (November 2019) **Contributed Poster**

26. Molecular classification of retinal neurons: from form to function, *Lawrence Berkeley Laboratory, Division of Biosciences*, (June 2019) **Invited Lecture**

25. Of Mice and Monkeys: single-cell analysis of the mammalian retina, *Halıcıoğlu Data Science Institute Special Seminar, University of California, San Diego*, (May 2019) **Invited Lecture**

24. Of Mice and Monkeys: single-cell analysis of the vertebrate retina, *Department of Pathology Seminar, University of Massachusetts Medical School, Worcester MA*, (April 2019), **Invited Lecture**

23. Of Mice and Monkeys: single-cell analysis of the mammalian retina, *Gladstone Institute of Neurological Disease and Bakar Computational Health Sciences, University of California, San Francisco*, (March 2019) **Invited Lecture**

22. Of Mice and Monkeys: single-cell analysis of the mammalian retina, *Department of Chemical Engineering, Stanford University*, (February 2019) **Invited Lecture**

21. Single-cell inference of retinal neuronal diversity, *Department of Bioengineering, University of California, San Diego*, (February 2019) **Invited Lecture**

20. Of Mice and Monkeys: single-cell analysis of the mammalian retina, *Department of Chemical and Biomolecular Engineering, University of California, Berkeley*, (February 2019) **Invited Lecture**

19. Of Mice and Monkeys: single-cell transcriptomic classification of the vertebrate retina, *USC Stem Cell and Broad CIRM Center, University of Southern California*, (February 2019) **Invited Lecture**

18. Of Mice and Monkeys: single-cell transcriptomic classification of the vertebrate retina, *Center for Computational and Integrative Biology, Massachusetts General Hospital, Boston*, (January 2019) **Invited Lecture**

17. Of Mice and Monkeys. Cell Types in the Mammalian Retina: From Form to Function, *Molecular and Systems Biology Seminar, Dartmouth College, Hanover, NH*, (September 2018) **Invited Lecture**

16. Of Mice and Monkeys: Molecular specification of cell types underlying central vision in primates, *Klarman Cell Observatory (KCO) Scientific Advisory Board (SAB) Meeting at Broad Institute, Cambridge MA*, (September 2018) **Invited Lecture**

15. Comprehensive Neuronal Taxonomy of the Mammalian Retina, *Sixth Annual KCO Retreat, Broad Institute, Cambridge MA*, (January 2018) **Invited Lecture**

14. A part's list of the retina, *Chan Zuckerberg Initiative at the Broad Institute, Cambridge MA*, (September 2017) **Invited Lecture**

13. Telling forests from trees: the role of analysis in single-cell transcriptomics, *Human Cell Atlas (HCA) computational working group*, (June 2017) **Invited Lecture**

12. Molecular address-book of retinal neurons, *KCO SAB meeting at the Broad Institute, Cambridge MA*, (June 2017) **Invited Lecture**

11. Single-cell RNA-sequencing efforts to map the brain, *United States Patent and Trademark Office Technology Fair, Washington DC*, (April 2017) **Invited Lecture**

10. Molecular specification of neuronal types using single-cell transcriptomics, *Chemical Engineering Department Semunar, IIT Bombay*, (January 2017) **Invited Lecture**

9. Deciphering cellular organization, development and disruption using single cell transcriptomics, *VIB Brain Mosaic conference, Leuven, Belgium*, (September 2016) **Invited Lecture**

8. Introduction to single cell RNA-seq analysis, *Cytomining Hackathon, Broad Institute, Cambridge MA*, (May 2016) **Invited Lecture**

7. Automatic Cellular Classification through Nonlinear Dimensionality Reduction, *Division of Biomedical Engineering, Hong Kong University of Science and Technology*, (January 2014) **Invited Lecture**

6. Coevolution in HIV proteins and its relevance for vaccine design, *Biosciences Department, IIT Bombay*, (December 2013) **Invited Lecture**

5. Collective Evolution in HIV Proteins : Sequences to Immunogens, *Workshop presentation, Keystone symposium on HIV vaccines, Keystone. CO*, (March 2012) **Invited Lecture**

4. Analysis of collective coevolution in HIV proteins reveals strategies for rational immunogen design, **Platform talk, Biophysical Society 56th Annual Meeting, San Diego CA** (Feb 2012) **Contributed Lecture**

3. Random Matrix Theory reveals the immunologic vulnerability of HIV, *Short talk, 13th Greater Boston Area Statistical Mechanics Meeting, Brandeis University* (October 2011) **Contributed Lecture**

2. Finding HIV's Achilles' Heel: Sequence Analysis to Vaccine Design, *Department of Chemical Engineering, MIT*, (October 2011) **Student Seminar**

1. Some effects of mass transfer limitations on hydrocarbon oxidation kinetics, with A. K. Suresh, *18th International Congress of Chemical and Process Engineering, Prague* (2008) **Contributed Lecture**

RESEARCH SUPPORT

- **Ongoing Research Support** (Amounts are the direct costs awarded to our group)
  - National Science Foundation, CRCNS US-German Research Award, $500,000, co-PI (11/01-2023-10/31/2028)
  - McKnight Foundation Neuroscience Award, $225,000, PI (08/01/2023-07/31/2025)
  - Rescorp Scialog Award, $50,000, PI (08/01/2023-07/31/2024)
  - Brightfocus Foundation Glaucoma Research Award, $200,000, PI (08/01/2023-07/31/2025)
  - Glaucoma Research Foundation Catalyst for a Cure 4 initiative, $600,000, PI (08/31/2022-08/30/2025)
  - Society of Hellman Fellows 2022-23, "Spontaneous activity dependent patterning of neural diversity in the developing brain", $60,000, PI (08/31/2022-08/30/2023)
- **Completed Research Support**
  - NIH R00, "Uncovering the molecular identity of retinal cell types, and their responses to nerve injury using single-cell transcriptomics", $749,000, PI (03/01/2020 - 02/28/2023)
  - Chan Zuckerberg Initiative, "Cell Atlas of the Human Eye from Birth to Old Age", $266,800, co-PI (with Joshua R. Sanes), (07/01/2020 - 06/30/2022)
  - NIH K99, "Uncovering the molecular identity of retinal cell types, and their responses to nerve injury using single-cell transcriptomics", $200,000, PI (trainee phase) (03/01/2018 - 12/31/2019)

PROFESSIONAL SERVICE

- Discussion leader on "Single cell omics technologies in the eye", *Vision Research Symposium 2022*, Baylor College of Medicine, Houston TX
- Session Chair, "Big data and machine learning to advance medicine", *AIChE Annual Meeting 2022*, Phoenix AZ
- Member, Human Cell Atlas Retina Annotation Panel

- Workshop Organizer, "Introduction to single-cell genomic technologies", *FASEB Retinal Neurobiology and Visual Processing 2022*, Southbridge MA
- Workshop leader on Genomics, Český Krumlov, Module on "Single-cell transcriptomics", 2018
- **Chemical and Biomolecular Engineering, UC Berkeley**
  - Chair, conflict of interest ad hoc committee (2023)
  - Member, Graduate Admissions Committee (Member 2019,2020,2021; Chair 2022)
  - Undergraduate Education Committee (Member 2020, 2021; co-chair 2022, 2023)
  - Dissertation Committees, 2023 (Nicholas Ouassil, Gonzalo Benegas, Yannick Omar)
  - Department Equity Advisor on three faculty search committees (2021-2022)
  - Member, Junior Faculty Search Committee (2020,2021)
  - Member, Committee on Diversity, Equity and Inclusion (2020, 2021)
  - Member, Adhoc committee on Statistics in the Undergraduate Curriculum (2020)
  - Dissertation Committees, 2022 (Amaresh Sahu, Clay Batton)
  - Qualifying Exam Committees, 2023 (Mira Khare, Pedro Guimares Martins, Anna Weldy, Henry Squire, Shiyi Yang), Qualifying Exam Committees, 2022 (Hailey Boyer, Kevin Espinet, Elizabeth Voke, Zach Lamberty), 2021 (Ketong Shao, Jeremy Adams, Jessica Mahinthakumar, George Makrygiorgos,Ana Carneiro, Ahmad Alkadri-Arafa, Kimberly Chan, Victor Miller), 2020 (Nicholas Ouassil, Alison Lui, Yannick Omar)
- **UC Berkeley**
  - Faculty Search Committee for Vision Sciences and Optometry (Member, 2023)
  - Graduate Admissions Committee, Center for Computational Biology (Member, 2022)
  - Graduate Admissions Committee of Biophysics Graduate Program (Member, 2021)
  - Graduate Admissions Committee of Helen Wills Neuroscience Institute (Member, 2021)
  - Faculty Reviewer, Amgen Scholars Program (2020)
  - Qualifying Exam Committees, Center for Computational Biology, 2020 (Gonzalo Benegas, Adam Gayoso), 2022 (Prakruthi Burra)
  - Thesis Committee Meetings, Helen Wills Neuroscience Institute: Zhongyang Gong, Leana King, Karina Bistrong.
  - Qualifying Exam Committees, Helen Wills Neuroscience Institute, 2021 (Zhongyan Gong), 2020 (Matt Davis)
  - Dissertation Committees, Vision Science Research Program, 2021 (Victoria Fong)
- **Peer reviewer** for *Briefings in Functional Genomics, Cell Reports, Cell Systems, Developmental Cell, eLife, Frontiers in Genetics, Genome Biology, Genome Research, Journal of Theoretical Biology, Nature Biotechnology, Nature Cell Biology, Nature Communications, Nature Methods, Nature Immunology, Neuron, Nucleic Acids Research, PloS Biology, PloS Computational Biology, PloS One, PNAS, Proteomics, Science Advances, Scientific Reports.*
- **Grant Review**
  - Koret-Berkeley-Tel Aviv Initiative (2021)

  - The French Muscular Dystrophy Association (AFM)-Telethon, Nervous System (Motoneuron and Neuromuscular Junction), (2020)
  - Landsteiner Foundation for Blood Transfusion Research (LSBR), (2017)
- **Review Editor** for Frontiers in Neuroscience (2020 -)
- **Consultant**: Olaris Therapeutics Inc (2016-2017)

TEACHING

- **UC Berkeley** (Evaluation range 1-7, 1=low, 7=high)
  - CBE142: Chemical Kinetics and Reaction Engineering, Fall '22
    - Instructor Effectiveness - 6.5, Lecture Quality - 6.73, Course Effectiveness - 6.24
  - CBE150A: Transport Processes, Spring '22
    - Instructor Effectiveness - 5.68, Lecture Quality - 6.02, Course Effectiveness - 5.83
  - CBE142: Chemical Kinetics and Reaction Engineering, Fall '21
    - Instructor Effectiveness - 6.57, Lecture Quality - 6.80, Course Effectiveness - 6.45
  - CBE150A: Transport Processes, Spring '21
    - Instructor Effectiveness - 5.79, Lecture Quality - 6.20, Course Effectiveness - 5.73
  - CBE142: Chemical Kinetics and Reaction Engineering, Fall '20
    - Instructor Effectiveness - 6.16, Lecture Quality - 6.57, Course Effectiveness - 5.88
  - CBE143: Data Analytics for Chemical Engineers, Spring '20 (with Prof. Ali Mesbah)
    - Instructor Effectiveness - 6.68, Lecture Quality - 6.77, Course Effectiveness - 6.44
- **Other**
  - CMPBIO 293 (UC Berkeley), "Single-cell transcriptomics of neural development", Fall 2021 (Guest Lecturer)
  - MIT 18.440 Analysis of Biological Networks, Lectures on "Single-cell RNA sequencing analysis", Spring 2017 (Guest Lecturer)
  - MIT 10.40 Chemical Engineering Thermodynamics, Fall 2011 (Teaching Assistant)
    - Overall Rating - 6.3/7
    - 2012 Best Teaching Assistant Award, Department of Chemical Engineering

ACADEMIC ADVISING

- **UC Berkeley**
  - <u>Ph.D. Students</u>
    1. Jafar Farhadi (CBE, 2023-)
    2. Dario Tommasini (Neuroscience, 2022-)
    3. Matthew Po (CBE, 2022 -)

4. Joshua B. Fernandes (CBE, 2021 -) (co-advised by Prof. Kranthi Mandadapu)
5. Kushal Nimkar (CBE, 2021 -)
6. Alhad Deshpande, (CBE, 2020 -) (co-advised by Prof. Kranthi Mandadapu)
7. Salwan Butrus, (CBE, 2019 -)
8. Joshua Hahn, (CBE, 2019 -)

– Postdoctoral scholars

1. Hyeongjoo Row (2022-), jointly with Prof. Kranthi Mandadapu
2. Rachana Deven Somaiya (2022-), postdoc with Marla Feller working closely with me.

– Undergraduate Researchers mentored by me

1. Ravtej Kaur (CBE, 2022-)
2. Nikhil Reddy (CBE, 2022-)
3. Seongeun Yun (CBE, 2022)
4. Ayush Kumar (CBE, 2022-)
5. Xiaoqi Sun (CBE, 2021 - 2022), PhD student at MIT
6. Jason Hou, (CBE, 2020 - 2022), Data Scientist
7. Shawn Koong, (CBE, 2020 - 2021)
8. Zaid Ahmad, (Mathematics and Statistics, 2020 - 2021)
9. Srikant Sagireddy, (CBE, 2020 - 2021). PhD student at Stanford University

– Rotation Students

1. D. Tommasini (Neuroscience, Oct-Dec, 2022)
2. P. Burra, (Center for Computational Biology, March-May 2021)
3. J. Dunnack, (Molecular and Cellular Biology, March-May 2020)

- **Before UC Berkeley**

– Broad Institute and Harvard University

* A. Sappington (B.S., MIT), undergraduate researcher (2018-2019), Marshall scholar Oxford University
* Q. (Alice) Wang (B.S., HKUST), undergraduate research (2017), PhD student Johns Hopkins University.

– MIT

* J. Everson and J. Wang, K-12 researchers (June-July 2014)
* S. Gupta (B.S, IIT Guwahati), undergraduate researcher (May-August 2013)
* C. F. Ruberman (B.S., Pomona College), undergraduate researcher (May-August 2012)
* S. Talsania (B.S., Loughborough University), undergraduate researcher (May-August 2010)