Krishna Melnattur, PhD

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Department of Biology and Psychology,
Ashoka University,
Plot No. 2, Rajiv Gandhi Education City
Post Office Rai, Near Rai Police Station,
Sonepat, Rai, Haryana
India 131029

Education

2008 **Ph.D. University of Massachusetts, Amherst, MA**
Molecular and Cellular Biology Program

2000 **B.Tech., Anna University, Chennai**
Industrial Biotechnology

Professional Experience

2021 Aug – now *Assistant Professor of Biology and Psychology* **Ashoka University, Sonepat, India**

2014 Mar – 2021 *Staff Scientist* **Dept of Neuroscience**, **Washington University School of Medicine, St Louis.** PI: Dr. Paul Shaw

2009 Nov – 2014Feb *Visiting post-doctoral fellow* **NIH/NICHD**. PI: Chi-Hon Lee

Peer reviewed publications

Lakhiani R, Shanavas S, and Melnattur K* (2023). Comparative biology of sleep in diverse animals. Journal of Experimental Biology. **226** (14), jeb245677.
* Corresponding author

Melnattur K, Kirszenblat L, Morgan E, Militchin V, Sakran B, English D, Patel R, Chan D, van Swinderen B, and Shaw PJ (2021). A conserved role for sleep in supporting spatial learning in Drosophila. Sleep Mar12 **44**(3), zsaa197.

Melnattur K, Zhang B, and Shaw PJ (2020). Disrupting flight increases sleep and identifies a novel sleep-promoting pathway in Drosophila. Sci. Adv. **6**, eaaz2166

Melnattur K, Morgan E, Duong V, Kalra A, and Shaw PJ (2020). The Sleep Nullifying APparatus: a highly efficient method of sleep depriving Drosophila. J. Vis. Exp **166**, e62105

Melnattur K, and Shaw PJ (2019). Staying awake to stay alive: a circuit controlling starvation induced waking. PLoS Biol **17**(3): e3000199

Melnattur K, Dissel S, and Shaw PJ (2015). Learning and memory: do bees dream? Curr Biol. **25**(21):R1040-1

Dissel S#, Melnattur K#, and Shaw PJ (2015). Sleep, Performance and Memory in Flies. Curr Sleep Med Rep **1**(1): 47-54
# Equal contributors

Melnattur KV, Pursley RH, Ting CH, Smith PD, Pohida TJ, and Lee CH (2014). Multiple redundant medulla projection neurons mediate color vision in *Drosophila*. J Neurogenet. Sep-Dec; **28**(3-4): 374-88

Karuppudurai T, Lin TY, Ting CH, Pursley RH, Melnattur KV, Diao F, White BH, Gallio M, Pohida TJ, and Lee CH (2013). A hard-wired glutamatergic circuit pools dim UV signals to mediate spectral preference in *Drosophila*. Neuron **81**(3):603-15

Melnattur KV, Berdnik D, Rusan Z, Ferreira C and Nambu JR (2013). The Sox gene Dichaete is expressed in local interneurons and functions in development of the Drosophila adult olfactory circuit. Dev Neurobiol. Feb; **73**(2): 107-26

Melnattur KV and Lee CH (2011). Visual Circuit Assembly in *Drosophila*. Dev Neurobiol. Dec; **71**(12): 1286-96

Mukherjee A, Melnattur KV, Zhang M, Nambu JR. (2006). Maternal expression and function of the *Drosophila* sox gene *Dichaete* during oogenesis. Dev Dyn. Oct; **235**(10): 2828-35.

Melnattur K, Rawson E, Nambu JR. (2002). P[52A-GAL4] is an insertion in the Drosophila GP150 gene. Genesis. 2002 Sep-Oct; **34**(1-2):29-33.

Book chapter

Melnattur K* (2023) Sleep, ageing and cognitive decline. In: Jagota, A. (eds) Sleep and Clocks in Aging and Longevity. Healthy Ageing and Longevity, vol 18. Pp 175 – 192. *Cham: Springer International Publishing*.
* Corresponding author

Manuscript in preparation

Melnattur K, Marshall Z, Li Z, Ford M, Periandri E, van Swinderen B, and Shaw PJ (2023). Mapping sleep circuits in *Drosophila* using Gaboxadol, a potent sleep promoting drug. *Manuscript in preparation*.

In mammals and flies, Gaboxadol impacts sleep via specific GABA-A receptor subunits. In the fly, Gaboxadol acts primarily via the *Glycine receptor* (*Grd*) and *Ligand-gated chloride channel homolog 3* (*Lcch3*) GABA-A receptors. To identify the neural circuits impacted by Gaboxadol to promote sleep, we conducted an unbiased screen by knocking down the *Grd* receptor using over 60 GAL4 lines. We have identified ~14 unique GAL4 lines, including specific subsets of neurons implicated in learning and memory, that attenuate Gaboxadol-induced sleep.

Fellowships

2021- 2026 DBT Ramalingaswami Re-entry Fellowship

Grants Awarded

2023-2026 SERB Core Research Grant (PI)

News Coverage

2023 *Shaastra Magazine* Waking up to the new science of sleep
2021 *Spectrum News* Sleep problems in autism may stem from leaky brain barrier Invited expert commentary

2020 *Natural History Magazine* July-Aug pg 7 (print) Sleeping it off
2020 *SleepReview* Sleep May Help Animals Adapt to New Situations, Suggests Fruit Fly Study
2020 *UPI News* Disabled flies sleep more as they learn to adapt
2020 *Biomedical Picture of the Day (MRC, UK)* Sleep on it
2020 *EurekAlert!* Flies sleep when need arises to adapt to new situations
2020 *ScienceDaily* Flies sleep when need arises to adapt to new situations
2020 *NewsMedical* Sleep may help animals adapt to challenging new situations
2020 *Phys.org* Flies sleep when need arises to adapt to new situations
2020 *Xinhua News* Flies sleep when need arises to adapt to new situation: study
2020 *Scientias.nl*(Dutch) Wat-doet-een-vlieg-als-hij-niet-kan-vliegen?-een-dutje
2020 *Popmech*(Russian) Покидая зону комфорта, приготовьтесь... ко сну
2020 *la Republica* (Italian) Non svegliate la mosca, si sta adattando
2020 *focusTech* (Italian) Il sonno aiuta i moscerini ad adattarsi ad una situazione d'emergenza
2020 *CitizenSide* (French) L'étude des mouches des fruits pourrait éclairer le sommeil en tant qu'outil évolutif

Selected Invited Talks

2023 *Institute for Stem Cells and Regenerative Medicine, Bengaluru*

2022 *Centre for Human Genetics*, *Bengaluru*

2021 *Brain Awareness Week*, *Project Encephalon*

2021 *Biology Colloquium*, *San Francisco State University*

2020 *California State University*, *East Bay*

2020 *Tata Institute of Fundamental Research*, *Hyderabad*

2020 *School of Biological and Chemical Sciences, University of Missouri Kansas City*

2020 *Summer Integrative Neuroscience Experience*, *Florida Atlantic University*

2019 *National Center for Biological Sciences*, *Bengaluru*

2019 *Division of Biological Sciences*, *Tata Institute of Fundamental Research, Mumbai*

Recent Conference Talks

2022 *India Neurobehavior Conference*

2021 *India Drosophila Research Conference*

2021 *International Conference on Chronobiology, JNCASR, Bangalore*

Teaching Experience

Classroom Teaching (at Ashoka)
2023 Monsoon Statistics and Research Methods II
2023 Summer Sleep and Learning module in the Lodha Genius Programme
2023 Spring Rhythms of Life and Sleep
2023 Spring Statistics and Research Methods II
2022 Monsoon Statistics and Research Methods II
2022 Spring Statistics and Research Methods I
2021Monsoon Statistics and Research Methods II

Guest Lectures (at Ashoka and WashU)

2023 Spring	Guest lecture in Advanced techniques in microscopy
2023 Spring	Guest lecture in Graduate Research Methods class
2022 Spring	Guest lecture in Graduate Research Methods class
2015 Fall	Guest lecture on sleep function and regulation in the "Genes, Brains and Behavior" undergraduate class at Washington University.
2014 Fall	Guest lecture on sleep function and regulation in the "Genes, Brains and Behavior" undergraduate class at Washington University.

Classroom Teaching (at UMass)

2006-2007 Spring	Teaching Assistant for BIO 284, "Genetics Lab." Aided with design and implementation of in class experiments, held review sessions and graded exams.
2004 Spring	Teaching Assistant for BIO 559, "Cell and Molec. Biol II". Developed suitable research project topics for students, held weekly review sessions and graded exams.
2002-2006 Fall	Teaching Assistant for BIO 100, "Introductory Biology". Led laboratory discussion and demonstrations, and designed and graded exams.
2001-2005 Spring	Teaching Assistant for BIO 102, "Introductory Animal Biology". Led laboratory discussion and demonstrations, and designed and graded exams.

Training Workshop

2022Dec	Science of sleep, UGC faculty induction workshop

Mentoring

PhD Dissertation Committee:

2023- Graduate dissertation committee for Omkar Sapre, a PhD student in Biology
2022- Graduate dissertation committee for Rahul Kumar, a PhD student in Biology
2023- Graduate dissertation committee member of Anandhu, a PhD candidate in Biology at Ashoka University
2023 Graduate dissertation committee member of Yoshita Sriramkumar, a PhD candidate in Biology at Ashoka University
2022- Graduate advisory committee member of Pragya Sharma, a PhD candidate at the Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
2022- Graduate dissertation committee member of Abhishek Singh, a PhD candidate in Biology at Ashoka University
2016-2018 Committee member on the dissertation committee of Shwetha Singh, a PhD candidate at Florida Atlantic University, Boca Raton, FL.

MSc Thesis supervision:

2024 Kangna Verma MSc Biology, Ashoka
2023 Mahima Samraik, BS-MS Biological Sciences, IISER Mohali
2023 Gokul Madhav, BS-MS Biological Sciences, IISER Behrampur
2023 Dhanika Lall, MSc Neuroscience, Jiwaji University, Gwalior

Undergraduate Thesis supervision:

2023: Rhea Lakhiani, Biology major, Ashoka scholars program
2023: Sahana Shanavas, Biology major, , Ashoka scholars program

Laboratory Mentoring
It has been my pleasure to work closely with each of these trainees in the lab, many of whom hail from minoritised and underrepresented communities. I have supported them in their varied career paths.

<u>At Ashoka University</u>

Rahul Kumar, PhD student

Omkar Sapre, PhD student

Priyanka Balasubramaniam, Project Associate

Gokul Madhav, Junior Research Fellow

Kangna Verma, Ashoka MSc Biology thesis student

Rhea Lakhiani, Research assistant

Anushna Pal, Senior ISM student

Thasya Shetty, Sophomore, Undergraduate Intern, Biology Major

Srimantee Mohanta, Sophomore, Undergraduate Intern, Psychology Major

Shaw lab at Washington University

Dorothy Chan, undergraduate student
Dorothy is in the MD program at the University of Cincinnati School of Medicine
Vincent Duong, undergraduate student
Vincent is currently in the Shaw lab, and a senior at Washington University
Arjan Kalra, undergraduate student
Arjan is currently in the Shaw lab, and a senior at Washington University
Zarion Marshall, undergraduate student
Zarion is a Graduate Student at the University of Chicago
Ellen Morgan, technician
Ellen is currently in the lab.
Rushi Patel, undergraduate student
Rushi is in the MD program at Rutgers New Jersey School of Medicine
Blake Sakran, undergraduate student
Blake is currently a Software Engineer at Hydro-Gear, Inc

Nambu lab at the University of Massachusetts

Dr. Colby Wells DeGraaf, undergraduate student
Dr. DeGraff later received a DVM from Colorado State University, and is currently a Veterinarian at Colorado Parks & Wildlife
Christopher Ferreira, undergraduate student
Christopher is a High School Science Teacher at Westport high school, New Bedford, MA
Dr. Rachel Kester, undergraduate student
Dr. Kester later received an DO from the University of Maine, and is currently a Psychiatrist at Cambridge Health Alliance
Dr. Sharon Li, undergraduate student
Dr. Li later received a MD from the University of Massachusetts Medical School, and is currently a specialist in Head and Neck Surgery at South Sacramento Health Center
Dr. Zeid Rusan, undergraduate student
Dr. Rusan later received a PhD from the University of California, Berkeley, and is currently a Manager, Bioinformatics at Personalis, Inc

Meeting Abstracts

Melnattur K, Periandri E, Marshall M, Li Z, Ford M, van Swinderen B, and Shaw PJ (2023) Mapping sleep circuits in Drosophila using Gaboxadol, a potent sleep promoting drug. **2019 Neurobiology of Drosophila meeting**. Cold Spring Harbor Laboratory. Abstract# 248

Melnattur K, Zhang B, and Shaw PJ (Oct 2019). Plasticity in a Drosophila wing circuit supports an adaptive sleep function. **2019 Neurobiology of Drosophila meeting**. Cold Spring Harbor Laboratory. Abstract# 208

Melnattur K, English D, Patel R, and Shaw PJ (April 2018). Sleep restores short term memory to flies assessed using a spatial learning task. **Sleep Regulation and Function Gordon Research Conference**. Abstract# 7

Melnattur KV, English D, Patel R, and Shaw PJ (Oct 2017). Sleep restores short term memory assessed using a spatial learning task. **2017 Neurobiology of Drosophila meeting**. Cold Spring Harbor Laboratory. Abstract# 197

Dissel S, Melnattur K, Kirszenblat L, Donlea J, Winsky-Sommerer R, van Swinderen B, and Shaw PJ (April 2016). **Sleep Regulation and Function Gordon Research Conference**. Abstract# 27

Melnattur K, Marshall Z, and Shaw PJ (Oct 2015). The neural sites of action of gaboxadol, a potent sleep promoting drug. **2015 Neurobiology of Drosophila meeting**. Cold Spring Harbor Laboratory. Abstract# 190

Melnattur KV, Pursley RH, Pohida TJ, Smith PD and Lee CH (Oct 2011) A behavioural analysis of fly colour vision **2011 Neurobiology of Drosophila meeting**. Cold Spring Harbor Laboratory. Abstract# 196

Melnattur K, and Nambu JR (Oct 2007). The Dichaete sox gene functions in the development of the adult olfactory system. **2007 Neurobiology of Drosophila meeting**. Cold Spring Harbor Laboratory. Abstract# 164

Melnattur K, and Nambu JR (Oct 2005). The fish-hook SOX gene functions in olfactory neuron and mushroom body development. **2005 Neurobiology of Drosophila meeting**. Cold Spring Harbor Laboratory. Abstract# 156

Melnattur K, and Nambu JR (Oct 2003).Expression and function of the fish-hook SOX gene in the adult nervous system. **2003 Neurobiology of Drosophila meeting**. Cold Spring Harbor Laboratory. Abstract# 116

Editorial Experience

2023- Reviewing Editor
eLife

2022- Review Editor
Frontiers in Neuroscience, Frontiers in Sleep

2013-2014 Associate Editor
NIH Fellows Editorial Board

2012-2013 Primary Editor
NIH Fellows Editorial Board

Service

Grant Review

2019 Human Frontiers Science Program

Manuscript Review

Reviewer for a number of journals including *Science Advances*, *eLife*, *Current Biology*, *SLEEP*, *Genes, Brains and Behavior*, *European Journal of Neuroscience*, *Journal of Experimental Biology*, *Neuroscience Letters* etc.

Academic Service

2023	ASP coordinator, Dept of Psychology, Ashoka University
2023	Institutional Bio Safety Committee, Ashoka University
2022-	MSc in Biology program committee**,** Dept of Biology
2021-2023	Seminar coordinator, Dept of Psychology, Ashoka University
2021-	Academic Integrity Committee, Ashoka University
2021 – 2002	Research Coordinator, Dept of Psychology, Ashoka University
2020	Panellist at the 2020 NIH Career Symposium
2018-2020	Staff representative to the Department seminar committee, WashU
2009-2010	Lab representative to the program seminar committee, NICHD
2006-2008	Graduate Student representative on the Faculty Research Council of the University of Massachusetts
2005-2007	Senator of the Graduate Student Senate, University of Massachusetts

Reader of undergraduate theses

2023	Anubhab Bhattacharjee, Aashka Shah – Biology ASP
2023	Devyani Sarin, Arpita Ghosh, Pranaya Prakash – Psychology ASP
2022	Ameya Menon – Biology ASP

References

Available upon request