

SOUMYA IYENGAR

Curriculum Vitae

Scientist 7 and Senior Professor

BRIC-National Brain Research Centre, Manesar

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India

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DOB: March 25, 1968

Academic and Professional experience:

2022 - present Scientist 7 and Senior Professor, BRIC-National Brain Research Centre, Manesar

2022-2026, Officiating Registrar, National Brain Research Centre, Manesar

2016 – 2022 Scientist 6 and Professor, National Brain Research Centre, Manesar

2011 – 2016 Scientist 5 and Additional Professor, National Brain Research Centre, Manesar

2008 - 2011 Scientist 4 and Associate Professor, National Brain Research Centre, Manesar

2003-2008 Scientist 3 and Assistant Professor, National Brain Research Centre, Manesar

2001-2003 Research Associate in Prof. Jon H. Kaas's lab, Vanderbilt University,
Dept. of Psychology, Nashville, Tennessee, USA

Education:

1993- 2000 Ph.D, University of Southern California, Los Angeles, California, USA
(Mentor: Prof Sarah W. Bottjer)

1989-1991 Master of Science (Anatomy), All India Institute of Medical Sciences,
New Delhi, India

1986-1989 Bachelor of Science Hons. (Human Biology) All India Institute of
Medical Sciences, New Delhi

Research Experience:

1992- 1993 Senior Research Fellow, Institute of Pathology (Indian Council of
Medical Research), New Delhi

Research:

Project 1: The primary auditory area is involved in perceiving pure tones whereas the surrounding association areas perceive speech as well as environmental sounds in humans. However, little is known about the structure of these areas during early development, even though hearing is known to begin at approximately 5 months in utero. Studies in my lab have focused on the development of excitatory and inhibitory synapses in the brain, from the third trimester until adulthood, using post mortem brain tissue. We have found that excitatory synapses are formed as early as ~34 gestation weeks (GW) in humans. Furthermore, pruning or refinement occurs between childhood and adolescence in corticocortical synapses, whereas thalamocortical synapses are pruned between adolescence and adulthood. Recent studies in my lab have shown that whereas inhibitory somatostatin interneurons undergo pruning and refinement between prenatal development and adolescence, parvalbumin-positive interneurons undergo pruning between childhood and adolescence. We are also studying changes in the development of inhibitory synapses in the developing human auditory cortex. Future studies will focus on studying patterns of connections within the auditory cortex of normal individuals and those from cases of schizophrenia, since this neurodevelopmental condition is associated with auditory hallucinations.

Project 2: The second project has focused on using passerine songbirds (zebra finches) as a model system to understand the modulatory role of the endogenous opioid system in vocalization and vocal learning. A set of well-defined neural circuits called the song control system (SCS, similar to mammalian cortical basal ganglia loops) exist in the brains of male birds to learn their songs from their fathers and then produce them during adulthood for courtship. Unfortunately, opioid substances are highly addictive and besides other effects, are known to cause slurring of speech and verbal deficits. Our results have shown that the endogenous opioid system affects the motivation to sing and the acoustic properties of song via different components of the SCS. Recent results from our lab have demonstrated that even small alterations in opioid modulation during development can lead to changes in the songs that juvenile male birds produce as adults. We are interested in continuing this research to understand the role of the opioid system in vocal learning and vocalization (both during development and adulthood) at the level of neural circuits, synapses and plasticity, using zebra finches as a model system. Recent studies in our lab have focused on using young male zebra finches as a model system to study vocal deficits associated with ASD (autism spectrum disorder). We plan to knock down ASD-associated genes in song control areas using lentiviral constructs or AAVs carrying shRNAs against zebra finch analogues of these genes, after which we will study their vocal behavior.

Project 3: A number of behavioural studies have demonstrated that amongst birds, corvids (including crows, rooks, jays and starlings) can perform at par with non-human primates on cognitive tasks which require causal reasoning, imagination, flexibility and foresight. Our initial studies focused on the basic structure and the organization of the dopaminergic system in the brain of house crows. We then found that house crows can learn both visual and auditory discrimination tasks, which are linked to food rewards. After birds were trained on a shape discrimination task, we found that dopaminergic neurons underwent significant changes in the complexity of their dendrites in the caudolateral NCL (caudal nidopallium), which is an analogue of the prefrontal cortex. These findings suggest that learning to associate specific types of behaviour with a reward leads to an increase in dendritic plasticity. Furthermore, we also found that there was an increase in neurogenesis in the brains of trained birds versus untrained controls, suggesting that training on the visual discrimination task led to an increase in adult neurogenesis in house crows. Recent studies in the lab have focused on the house crow auditory system. We decided to combine neuroanatomy, functional magnetic resonance imaging and diffusion tensor imaging to study auditory areas and their connections in the house crow brain. Besides providing an understanding of the effects of different kinds of auditory stimuli on the auditory cortex itself, we have started training house crows on a reward-related task based on auditory cues. The results will provide a greater understanding of how the auditory system is linked to the reward pathways of the brain and to brain regions important for decision-making such as the NCL.

Grants:

- Emergence of primary and non-primary auditory cortical areas during late fetal and early postnatal ages in humans. Dept of Biotechnology, India (March 2005 – September 2008)
- Effects of altering the levels of neuronal proliferation on the learning and production of song behavior in male zebra finches. Dept of Biotechnology, India (December 2007 – December 2010).
- Opioid modulation of song in male zebra finches. Dept. of Science and Technology, India (June 2010 – December 2013)
- Neurobiology and understanding Circadian system linkage of cognitive performance in an avian model system. Dept. of Science and Technology, India (January 2011 – January 2014)
- Effects of the δ -Opioid Receptor System on Singing and Song Learning in Zebra Finches. Dept. of Science and Technology, India (Sept 2016 – Sept 2019)

- The Sensitive Period of the Human Auditory Cortex – a Neuroanatomical Study. Indian Council of Medical Research, India. ICMR #2019-0155 [No. 51/4/2019-Ana/BMS] (Sept 2019 – July 2023); Rs 42.096 Lakhs
- Exploring Auditory Perception in House Crows using functional Magnetic Resonance Imaging and Neuroanatomical Techniques. Dept. of Science and Technology, India. Collaboration with Prof S Senthil Kumaran, AIIMS, New Delhi. CRG/2019/002672 (May 2020 – Nov 2023); Rs 28.04 Lakhs (NBRC), Rs 37.22 Lakhs (AIIMS)
- Autism Spectrum Disorders, Genes and the Gut Microbiome: Utilizing Song Birds (Zebra Finches) as a Model System. Dept. of Science and Technology, India. Collaboration with Prof Manoj Raje and Prof Saumya Raychaudhuri, CSIR-IMTECH, Chandigarh; DST/CSRI/2017/69 (March 2021 – March 2024); Rs 41.45 Lakhs
- Using Zebra Finches as a Model System to test the Role of Opioid Receptors underlying Vocal Deficits in Autism Spectrum Disorder (BT/PR58214/BMS/85/1171/2025) Accepted, Aug 2025; Rs. 89.4496 Lakhs.

Publications:

1. Anjali, Pundir AS, Radotra B, Gupta K, Gupta S, Sharma M, Jhansi Lakshmi M, Lalwani S and **Iyengar S** (2026). Developmental Trajectories of Somatostatin-Positive Interneurons in the Human Auditory Cortex from Migration to Maturation. *Commun Biol*; 9; 881 (2026); <https://doi.org/10.1038/s42003-026-10120-3>
2. Din U, Banerjee S and **Iyengar S** (2026). Opioid Modulation of Differential Gene Expression and Neuronal Differentiation in the Ventricular-Subventricular Zone of Adult Male Zebra Finches. **Ann Neurosci**. 2026 Feb 18:09727531251410391. doi: 10.1177/09727531251410391. Epub ahead of print. PMID: 41728054; PMCID: PMC12916333.
3. Singh UA and **Iyengar S** (2025). Delta Opioid Receptors affect Acoustic Features of Song during Vocal Learning in Zebra Finches. *BMC Neuroscience*; 26:4; <https://doi.org/10.1186/s12868-025-00927-x>
(In the Collection: 'Behavioral neuroscience of vocal learning in avian and mammalian species').
4. Bhatt, S, Verma, AK, Dastidar PG, Kumar, P, Thapa, P, Jacob TJ, Roy, TS, **Iyengar, S**, Kumaran, S, Ahluwalia BS and Mehta DS (2025). Investigation on morphological and molecular fingerprints of penguin brain using label-free optical imaging and

- spectroscopic techniques. Sci. Reports, 15:4923 1; <https://doi.org/10.1038/s41598-024-76127-0>
5. Parishar P, Rajagopalan M and **Iyengar S** (2024). Changes in the Dopaminergic circuitry and Adult Neurogenesis linked to Reinforcement Learning in Corvids. Front Neurosci. 2024 May 14;18:1359874. doi: 10.3389/fnins.2024.1359874. PMID: 38808028; PMCID: PMC11130420.
 6. Roy A, Sharma B, Banerjee J, **Iyengar S**, Jain S (2022). Dual role of low frequency magnetic field on neuroinflammation induced dendritic trimming and memory impairment on rat model of sporadic Alzheimer's disease. May 2022; The FASEB Journal 36(S1); DOI:10.1096/fasebj.2022.36.S1.R4683
 7. Parishar P, Sehgal N and **Iyengar S** (2021): The Expression of delta opioid receptor mRNA in adult male zebra finches (*Taenopygia guttata*). PLoS ONE 16(8): e0256599. <https://doi.org/10.1371/journal.pone.0256599>.
 8. Parishar P, Mohapatra AN and **Iyengar S** (2021): Investigating Behavioral Responses to Mirrors and the Mark test in adult male Zebra Finches and House crows. (2021) Frontiers in Psychology, Article 637850; doi: 10.3389/fpsyg.2021.637850.
 9. Kumar S, Mohapatra AN, Pundir AS, Kumari M, Din U, Sharma S, Dutta A, Arora V, **Iyengar S** (2020): Blocking Opioid Receptors in a Songbird Cortical Region modulates the Acoustic Features and Levels of Female-Directed Singing. (2020) Frontiers in Neuroscience, September 2020; Volume 14; Article 554094; doi: 10.3389/fnins.2020.554094
 10. Singh UA and **Iyengar S**. (2019): The Expression of DARPP-32 in Adult Male Zebra Finches (*Taenopygia guttata*). Brain Structure and Function. DOI: 10.1007/s00429-019-01947-0.
 11. Kumar S, Mohapatra AN, Sharma H, Singh UA, Kambi N, Velpandian T, Rajan R, **Iyengar S** (2019): Altering opioid neuromodulation in the songbird basal ganglia modulates vocalizations. Frontiers in Neuroscience, (Neuropharmacology) July 3 2019, DOI: 10.3389/fnins.2019.00671.
 12. Sen S*, Parishar P*, Pundir AS, Reiner AJ and **Iyengar S** (2019): The Expression of Tyrosine Hydroxylase and DARPP-32 in the House Crow (*Corvus splendens*) brain. (2019). J. Comp. Neurol. 527(11):1801-1836. doi: 10.1002/cne.24649. * Equal contribution.
 13. Singh UA*, Kumari M* and **Iyengar S** (2018): Method for improving the quality of genomic DNA obtained from minute quantities of tissue and blood samples using Chelex

- 100 resin. Biol Proced Online. 2018 Jun 1;20:12. doi: 10.1186/s12575-018-0077-6.
eCollection 2018. * Equal contribution.
14. Pundir AS*, Singh UA*, Ahuja N, Makhija S, Dikshit PC, Radotra B, Kumar P, Shankar SK, Mahadevan A, Roy TS, **Iyengar S** (2015) Growth and Refinement of Excitatory Synapses in the Human Auditory Cortex. Brain Structure and Function; 221(7), 3641-3674. * Equal contribution.
 15. Sharma J, Mukherjee D, Rao S, **Iyengar S**, Shankar SK, Satishchandra P and Jana NR (2013) Neuronatin mediated aberrant calcium signaling and endoplasmic reticulum stress underlie neuropathology in Lafora disease. Journal of Biological Chemistry, 288(13); 9482-9490.
 16. Pundir AS, Hameed LS, Dikshit PC, Kumar P, Mohan S, Radotra B, Shankar SK, Mahadevan A, **Iyengar S** (2012) Expression of Medium and Heavy Chain Neurofilaments in the Developing Human Auditory Cortex. Brain Structure and Function; Volume 217, Issue 2: 303-321.
 17. Haldipur P, Bharti U, Alberti C, Sarkar C, Gulati G, Iyengar S, Gressens P, Mani S (2011) Preterm Delivery Disrupts the Developmental Program of the Cerebellum. PloS ONE; 6(8).
 18. Haldipur P, Bharti U, Govindan S, Sarkar S, **Iyengar S**, Gressens P, Mani S (2011) Expression of sonic hedgehog during cell proliferation in the human cerebellum. Stem Cells and Development.; 21(7): 1059-1068
 19. Khurshid N, Hameed, LS, Mohanasundaram, S and **Iyengar S** (2010) Opioid modulation of cell proliferation in the ventricular zone of adult zebra finches (*Taenopygia guttata*). FASEB J. 24; 3681-3695.
 20. Khurshid N, Jayaprakash, N, Hameed, LS, Mohanasundaram, S and **Iyengar S** (2010) Opioid modulation of singing in male zebra finches (*Taenopygia guttata*). Behav. Brain Res. 208 (2); 359–370.
 21. Khurshid N, Aggarwal V and **Iyengar S** (2009): Localization of μ - and δ - opioid receptors in song control regions of adult male zebra finches (*Taenopygia guttata*). J. Chem. Neuroanat. 37(3); 158–169.
 22. Tripathi A, Khurshid N, Kumar P, **Iyengar S** (2008) Expression of μ - and δ - opioid receptor in the proliferative neuroepithelium of the developing human neocortex. Neurosci. Res. 61: 257–270.
 23. Karunakaran S, Diwakar L, Saeed U, Agarwal V, Ramakrishnan S, **Iyengar S**, and Ravindranath V (2007) Activation of apoptosis signal regulating kinase 1 (ASK1) and

- translocation of death-associated protein, Daxx, in substantia nigra pars compacta in a mouse model of Parkinson's disease: protection by alpha-lipoic acid. *FASEB J.*; 21(9):2226-2236.
24. **Iyengar, S**, Jain, N, Qi, HX and Kaas, JH (2007) Cortical and Thalamocortical Connections of the Oral Cavity Representations in Area 3B of New World Monkeys. *J. Comp. Neurol.* 501(1): 95 – 120.
 25. Kaas JH, Qi HX, **Iyengar S**. (2006) Cortical network for representing the teeth and tongue in primates. *Anat Rec A Discov Mol Cell Evol Biol.*; 288(2):182-190.
 26. **Iyengar, S**, and Bottjer SW (2002) Developmental Changes within Individual Axon Arbors of a Thalamocortical Circuit Necessary for Song Learning in Zebra Finches **J. Neurosci** 22(3): 901-911.
 27. **Iyengar, S**, and Bottjer SW (2002) The Role of Sensory Experience in the formation of Neural Circuits Underlying Vocal learning in Zebra Finches **J. Neurosci** 22(3): 946-958.
 28. **Iyengar, S**, Viswanathan SS, and Bottjer SW (1999) Development of Topography within Song Control Circuitry of Zebra Finches during the Sensitive Period for song learning. **J. Neurosci.** 15 :19(14): 6037-6057.

Book Chapters and Reviews:

1. Singh U.A. and **Iyengar S**. (2022): The Role of the Endogenous Opioid System in the Vocal Behavior of Songbirds and its Possible Role in Vocal Learning. *Frontiers in Physiology (Avian Physiology)*, February 2022 | Volume 13 | Article 823152; doi: 10.3389/fphys.2022.823152.
2. Kumar S and **Iyengar S** (2018): Avian Striatal Complex, *Encyclopedia of Animal Cognition and Behavior*. Edited by Jennifer Vonk and Todd K. Shackelford; Springer Nature Switzerland AG; https://doi.org/10.1007/978-3-319-47829-6_1441-1
3. **Iyengar S**, Parishar P and Mohapatra AN (2017): Avian Cognition and Consciousness - from the Perspective of Neuroscience and Behaviour, *Self, Culture and Consciousness: Interdisciplinary Convergences on Knowing and Being*. Springer Nature Singapore Pte Ltd.; DOI 10.1007/978-981-10-5777-9. Eds: S. Menon, N. Nagaraj and VV Binoy, Chapter 2, Pg 23-50.
4. **Iyengar S** (2012): Development of the Human Auditory System. *J. Indian Inst. Sci.* 92:4; 427-440 (Invited review), in the issue on “Development and Disorder of the Nervous System”, edited by Prof. TN Guru Row, guest-edited by Dr. S. Mani.

5. **Iyengar S** (2010) Comparative and Evolutionary Aspects of Cognition. Chapter in “Expanding Horizons of the Mind Science(s)” Edited by Prof. PN Tandon and Prof RC Tripathi.
6. Iyengar, B, Subalakshmi, R, **Iyengar, S**, Murthy, J (1996) Melanotrophin Dependence of Proliferating Melanocytes In: **Growth Disorders of the Pigment Cell (eds. Iyengar, B and Singh, A) BI Churchill Livingstone: New Delhi.**

Invited Talks/Lectures

2026:

- “Wiring the Human Auditory Cortex during the Sensitive Period”
Invited talk, 3rd BRICS Neuroscience Symposium, SGBC, IIT Madras, Jun 5th – 7th.
- "Effects of Opioid Neuromodulation on Singing and Song learning in Zebra Finches",
Invited talk, Indian Wildlife Ecology Conference Symposium, Ashoka University, Haryana, Jul 10th - 12th.

2025:

- “Neural Correlates of Learning in House Crows”
Invited talk, Brain Ecology and Behaviour, NSAB, IISER Mohali, March 10th -12th.
- “Wiring the Human Auditory Cortex: Structural Changes during the Sensitive Period”
Dr Shankar Oration, JNU, BBIF International Biobanking Conference, Feb 24th-25th, 2025.

2024:

- “A Songbird Model System to study Vocal Deficits in Neurodevelopmental Disorders”
21st NBRC Foundation Day Symposium, NBRC, Manesar, Dec 13th-15th, 2024.
- “The Role of the Opioid System in Singing and Song learning in Zebra Finches”
EMBO Workshop on Neuropeptides and Behavioural flexibility.
Invited talk, NISER, Bhubaneshwar, Dec 5-8th, 2024.
- “Using Zebra finches as a model system to study Vocal Deficits in Neurodevelopmental Disorders”
Mini Symposium: Autism Spectrum Disorder: Genetic and neural circuit dysfunction of developing brain; Dr. Sourav Banerjee, NBRC, Manesar, IAN, NIMHANS, Bengaluru, Nov 12-14th, 2024.
- “Introduction to Neuroanatomy”
NeuroTechLab: Applied Techniques in Neuroscience Research, NBRC, Manesar, Aug 6th, 2024.
- “Auditory Perception and developing Human Auditory System”
Alzheimer’s Association International Conference (AAIC) Neuroscience Next 2024: India Hybrid Hub Meeting, NIMHANS, Bengaluru, Apr 22nd-23rd, 2024.
- “House Crows (*Corvus splendens*) - Brain and Behaviour”
Nerve-Storming: From Molecules to Behaviour; JNCASR, Bengaluru, Mar 8th-9th, 2024.

2023:

- "Establishment of Neural Circuits in the Developing Human Auditory Cortex"
41st Annual Meeting, IAN, Gwalior, Jiwaji University.
Mini Symposium: Development of the Nervous System. Chair: Prof TC Nag, AIIMS, New Delhi, Oct 3rd - 6th, 2023.
- "Development of Neural Circuits in the Human Auditory Cortex"
Invited talk, ISHACON 2023; 54th Annual National Convention of The Indian Speech-Language and Hearing Association of India. Organized by Delhi Branch of Indian Speech and Hearing Association, Feb 17th, 2023.
- "Birds in Neuroscience Research"
Certificate Course on Laboratory Animal Science, NBRC, Feb 6th - Feb 17th, 2023.

2022:

- "The Avian Black Box - the Crow Brain"
Theme: Recent trends in Brain research: Unlocking the mysteries of the brain,
IBRO Invited talk, IBRO Virtual Symposium (Institute of Home Economics, University of Delhi), Mar 22nd - 23rd, 2022.

2021:

- "Brain-behaviour interactions in the 'Shining Raven'"
Invited talk, Synapse: Symposium (online), IISER, Tirupati, Dec 4th, 2021.

2020:

- "Neural Correlates of Learning and Decision-Making in House Crows"
The Neurogroup meeting, Dadhikar Fort, Alwar, Rajasthan, Mar 8th - 9th, 2020.

2019:

- "Neural Plasticity and the Development of Axonal Connections in the Human Auditory Cortex"
IAN 2019, All India Institute of Medical Sciences, New Delhi, 19th - 21st Nov, 2019.
- "The Role of the Opioid System in Singing and Song Learning in Zebra Finches"
Invited lecture, Dept of Psychology, Vanderbilt University, Nashville, TN, USA, 24th Oct, 2019.
- "Corvid Brain Structure, Cognition and Mirror Self-Recognition"
Invited lecture, BIOSPARKS-2019, Organized by the School of Life Sciences, JNU, New Delhi, 15th - 16th March, 2019.

2018:

- "Three-dimensional reconstruction of Neurons"
3rd Asian and African Stereology Congress, Maulana Azad Medical College, New Delhi, 18th - 20th Dec, 2018.
- "Development of Axonal Connections in the Human Auditory Cortex"
3rd IBRO/APRC Chandigarh Neuroscience School, Panjab University, Chandigarh, 1st Dec, 2018.
- "Neuroplasticity in the Developing Human Auditory Cortex"
IBRO-APRC School, Organized by the Dept of Physiology, AIIMS, New Delhi, 21st Oct - 4th Nov, 2018.
- "The μ -Opioid Receptor System Modulates the Motivation to Sing and Acoustic Features of Female-Directed Song in Zebra Finches"
S Kumar, AN Mohapatra, R Narayan, UA Singh, S Sharma, V Arora, N Kambi, A Datta, H

Sharma, T. Velpandian and S Iyengar, International Congress of Neuroethology, Brisbane, Australia, 15th - 20th Jul, 2018.

2017:

- "Neural Circuits, Singing and Song Learning in Zebra finches"
Theme: The challenge to learn: new approaches to study the problem of stability vs. plasticity in the brain. Organized by Indo-German Seminar, Indian National Science Academy and the German Academy of Sciences Leopoldina, LV Prasad Eye Institute, Hyderabad, 28th - 29th Nov, 2017.
- "Opioid Modulation of Song Learning in Male Zebra Finches"
35th IAN meeting, Ravenshaw College, Cuttack, Odisha, 29th - 31st Oct, 2017.
- "Opioid Neuromodulation and Singing in Male Zebra Finches"
XXVI International BioAcoustics Congress, Haridwar, 8th - 13th Oct, 2017.
- "Development of the Human Auditory Cortex"
TEDx event organized by the Inst of Chemical Engg., Mumbai, 8th April, 2017.
- "Opioid Neuromodulation and the Motivation to Sing in Adult Male Zebra Finches"
International Symposium on Biological Timing and Health Issues in the 21st Century (in conjunction with the IUSSTF-sponsored Indo-US Workshop and Symposium); Dept. of Zoology, University of Delhi, Indo-US Joint Center on Biological Timing, University of Delhi, The Indian Society for Chronobiology, Feb 21-24, 2017.

2016:

- "Effects of Mu-opioid Receptor Modulation on Singing in Adult Male Zebra Finches"
XXXIV Annual Conference of Indian Academy of Neurosciences, NBRC, Manesar, Oct 19- 21, 2016.
- "The Role of Mu-Opioid receptors in modulating the songs of Adult Male Zebra Finches", NeuroGroup Meeting, Khandala, Pune, Sept 25-26, 2016.
- "Mirror, Mirror on the Wall and some other aspects of Corvid Brain Structure and Cognition"
Invited Talk (Host: Dr. Raghav Rajan), IISER Pune, Jul 25, 2016.
- "The Effects of Opioids on Vocalization and Vocal learning using Songbirds as a Model System"
Theme: Development and Functions of Brain Circuits: From Molecules to Behaviour, IBRO-APRC (Asia Pacific Regional Committee) School, NBRC.; Mar 18, 2016.
- "Cognition in Corvids – an Avian Model System"
Cognitive Science workshop and NBRC-IIT-D workshop, Jan 16, 2016.

2015:

- "Principles of Immunohistochemistry"
Invited lecture, Dept of Anat, MAMC, March 13th, 2015.

2014:

- "Auditory System"
Eighth DST-SERB School in Neuroscience, Centre for Neural and Cognitive Sciences, IISER Pune, Dec 13, 2014
- "Development of Neural Circuits in the Human Auditory Cortex"
Invited lecture, International Symposium on Translational Neuroscience and XXII Annual Conference of Indian Academy of Neuroscience, NIMHANS, Bangalore, Nov 2, 2014

- “Cognition in Corvids”, Invited lecture, Sophia College, Mumbai, Feb 6, 2014

2013:

- "Neuromodulators and learning in songbirds"
Lab: Anatomy of Bird Brain
Seventh DST-SERB School in Neuroscience, Centre for Neural and Cognitive Sciences, University of Hyderabad, Dec 11-12, 2013.
- “Auditory System – I”
Seventh DST-SERB School in Neuroscience, Centre for Neural and Cognitive Sciences, University of Hyderabad, Dec 11-12, 2013
- “Auditory System – II”
Seventh DST-SERB School in Neuroscience, Centre for Neural and Cognitive Sciences, University of Hyderabad, Dec 11-12, 2013

2012:

- “Auditory System – I”
Sixth DST-SERB School in Neuroscience, National Institute of Science Education and Research (NISER), Bhubaneswar, Orissa, Dec 18-19, 2012
- “Auditory System – II”
Sixth DST-SERB School in Neuroscience, National Institute of Science Education and Research (NISER), Bhubaneswar, Orissa, Dec 18-19, 2012
- “Organization of the Vertebrate Nervous System”
Fourth DST-SERB school in Chronobiology, NEHU, Shillong, June 20-21, 2012
- “Comparative Aspects of Brain Evolution - Mammals versus Birds”
Fourth DST-SERB school in Chronobiology, NEHU, Shillong, June 20-21, 2012
- “Birdsong and Learning”
Presented at the Fifth DST-SERC School in Neuroscience (Learning and Memory), NIMHANS, Bangalore, Feb 16 – Feb 29, 2012.

2011:

- “Song Learning in Birds”
Presented at the Brain and Cognition Workshop (sponsored by DST and IUSSTF), IISc, Bengaluru, July 7, 2011.
- “Basics of the Auditory System”
Presented at the Fourth DST-SERC School in Neuroscience (Systems and Cognition), NBRC, Manesar, Feb 21 – March 6, 2011.
- “Bird Brains’ and Mammalian brains – Comparative Aspects”
Presented at the Fourth DST-SERC School in Neuroscience (Systems and Cognition), NBRC, Manesar, Feb 21 – March 6, 2011.
- “The Opioid System in Zebra Finches”
Presented at the Fourth DST-SERC School in Neuroscience (Systems and Cognition), NBRC, Manesar, Feb 21 – March 6, 2011.

2010:

- “Introduction to the Human Brain”
Presented at the IBRO-APRC (Asia Pacific Regional Committee) School of NeuroImaging (Theme: Study of Human Brain Structure and Function using Magnetic Resonance Imaging and Spectroscopy) held at NBRC, Manesar, Nov 29 - Dec 10, 2010

2009:

- “The Auditory Cortex – a Neuroanatomical Investigation”

Presented at the National Programme on Perception Engineering (Technical Workshop) held at NBRC, Manesar, Dec 4-5, 2009.

- “Development of the Human Auditory Cortex – Neuroanatomical Studies” Presented at the Psychology Dept., Vanderbilt University, Nashville, TN, USA, October 22-23, 2009.
- “The role of the opioid system in singing and other behaviors in adult male zebra finches” Functional Biology: Comparative Aspects, 2nd Mtg of the Indian Subcontinent Branch of the International Peptide Society, Dept. of Zoology, University of Lucknow, March 19-21, 2009
- The Auditory System”
Presented for “The Making of Mind”, Cognitive Neuroscience Workshop organized by IBRO and NBRC, Jan 5-16, 2009.

2008:

- “Methods in Neuronal and Axonal tracing.” Workshop on Imaging Neurodegeneration: Molecules to mind, IIT-Delhi, Sept 5-6, 2008.
- “Development of the Human Auditory Cortex – Neuroanatomical Studies.” Symposium on Brain, Cognition and Behaviour, Sch. Of Language, Lit. and culture studies, JNU, March 14-15, 2008.

2007:

- “The expression of different markers and changes in cytoarchitecture in the developing human auditory cortex.”
Current Trends in Auditory Research, MAMC, Sept 21-22, 2007.
- “The development of the human auditory cortex.”
- 9th Karnataka Chapter of Anatomists, Conference and Workshop (Special theme: Recent Advances in Neuroanatomy) organized by JSS Medical College, Mysore, May 25-27, 2007.
- “A comparison of the human auditory cortex at different stages of development.” Indo-US Symposium on Developmental Neuroscience and Imaging, New Delhi, Organized by NBRC, funded by the Indo-US Science and Technology Forum, Feb 19-21, 2007.

2006:

- “A New Dimension to NMR: From molecules to Human Behaviour” Guest lecture, 5th NMR School, MAHE, Manipal, May 22 - June 2, 2006.
- “Studies on developmental and adult neural plasticity using songbirds as a model system.”

National Symposium on Neural Plasticity and Repair, New Delhi, Organized by AIIMS, New Delhi and Indian Society of Pain Research and Therapy, Oct 18-19, 2006.

Membership of Professional bodies / societies:

Indian Academy of Neurosciences

Society for Neuropeptides and Neuroendocrinology, Pune

Editorial Board and Grant Review Committees:

- Editorial Board Member, Developmental Neuroscience (Karger), Editor-in-Chief Steven W. Levison
- Review Editor, Frontiers in Molecular Neuroscience (2017)
- Member, International Peer Review Panel Joint Canada-Israel Health Research Program (Biomedical sciences in Neurobiology), Canadian Institutes of Health Research (CIHR), the Israel Science Foundation (ISF), the Azrieli Foundation, and the International Development Research Centre (IDRC) (2018)
- Special Expert Invitee for the 2nd PAC Project Monitoring Review meeting of Organismal and Evolutionary Biology – Animal Sciences, DST (2019)
- Reviewer, CEFIPRA grants (2022)
- Member of selection committee for the Fulbright-Nehru Doctoral Research Fellowships (STEM 1) (2023-2024)
- Member of the Subject Expert Committee for Life Sciences - II: Plant Sciences, Biochemistry, Biophysics and Molecular Biology for the Prime Minister Early Career Research Grant (PMECRG) program of Anusandhan National Research Foundation (ANRF) (2025)

Research Supervision and Manpower Training:

Teaching:

I have been the Course Coordinator of the Neuroanatomy Course which is a part of the first year course-work for NBRC PhD and Integrated MSc-PhD students from 2004 until now (2026). In addition to didactic lectures, students are given demonstrations of preserved post-mortem human brains to help them visualize the location of various brain regions. I have also given lectures on the auditory system for the Systems Neuroscience course at NBRC. Furthermore, I have been the Course Coordinator for Developmental Neuroscience (2010 – 2011) and the Course Coordinator for Systems Neuroscience (2019 – 2026) and have taught a part of the course.

Ph.D., Integrated MSc-Ph.D. and MSc Research Supervision:

PhD students

Nazia Khurshid (PhD student)

2004 – 2010

Role of Opioid System in Behavior and Cell Proliferation in Adult Male Zebra finches (*Taenopygia guttata*), PhD Thesis. Submitted Feb 18th, 2010, Awarded July 15th, 2010.

Sandeep Kumar (PhD student)

2011- 2021

Opioid Modulation of Singing in Adult Male Zebra Finches, PhD thesis. Submitted Sept 2020, Awarded 3/2/2021

Mukta Kumari (PhD. Student)

2015-2024

Role of Mu-Opioid receptors in song learning in male zebra finches (*Taenopygia guttata*)

Anjali Bind (PhD Student)

2020 – (ongoing)

Development of Inhibitory Interneurons and Stabilization of Perineuronal Nets Shape the Sensitive Period of the Human Auditory Cortex

Banismaita Tripathy 2023 – (ongoing)

Soumya Golchha 2023 – (ongoing)

Integrated MSc-PhD students

Shankhamala Sen (Integrated MSc-PhD student) 2010 - 2021
Neuroanatomical Studies of the House Crow (*Corvus splendens*) Brain.

Utkarsha A. Singh (Integrated MSc-PhD student) 2012-2022
Role of Delta Opioid Receptors in Singing and Song Learning in Zebra Finches.

Pooja Parishar (Integrated MSc-PhD student) 2012-2023
Neural Correlates of Learning and Decision-Making in Corvids.

Uzma Din (Integrated MSc-PhD student) 2011-2026
Role of Opioid System in modulating neurogenesis and song behaviour in adult male zebra finches (*Taenopygia guttata*).

MSc students

Geetika Phukan	2005 – 2006 (completed)
Anushree Tripathi	2006 – 2007 (completed)
Varsha Ramakrishna	2017 – 2018 (completed)
Rishika Tiwari	2019 – 2020 (completed)
Bhanumita Agrawal	2020 – 2021 (completed)
R. Madhumita	2021 – 2022 (completed)
Yogini Tiwai	2025 – 2026 (completed)
Aruna P Thangadurai	2026 – (ongoing)

Research Associates:

Dr Payal Arya, Post-Doctoral Fellow	2016-2017
Dr Sonika Charak, Post-Doctoral Fellow	2019-2025
Dr Y. Soniya Devi, Post-Doctoral Fellow	2023-2024
DBT Biocare Fellow	2025 - present
Dr Mukta Kumari, Research Scientist	2025 - present