

**ShubhaTole**

Department of Biological Sciences  
 Tata Institute of Fundamental Research  
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 Date of Birth: 31/08/1967

**Current Appointment:**

<b>Professor</b>	Department of Biological Sciences Tata Institute of Fundamental Research, India	2011-present
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**Previous Appointments:**

Visiting Professor	University of Geneva	2014
Visiting Associate Professor	Stanford University	2008-2009
Associate Professor	Tata Institute of Fundamental Research, India	2007-2011
Reader	Tata Institute of Fundamental Research, India	2002-2007
Fellow	Tata Institute of Fundamental Research, India	1999-2002
Post Doctoral Fellow	University of Chicago	1994-1999

**Education:**

Ph D	California Institute of Technology	1994
MS	California Institute of Technology	1991
BSc	St. Xavier's College, University of Bombay	1987

**Awards, Honours, and Grants:**

- The Infosys Prize in Life Sciences** (2014)  
(<http://www.infosys-science-foundation.com/prize/index.asp>)
- The 1<sup>st</sup> Swati Maiti memorial seminar**, IISc, Bangalore (2013)
- K. T. Shetty memorial oration**, Indian Academy of Neurosciences (2011)
- The S. S. Bhatnagar Award in Biological Sciences** (India's highest scientific honor: <http://ssbprize.gov.in/>) (2010)
- Research Award for Innovation in Neuroscience (RAIN award)** (2008)  
Society for Neuroscience, USA
- Wellcome Trust Flexible Travel Award** (2008-2009)  
For a Sabbatical year at Stanford University, USA
- National Woman Bioscientist award** (2008)  
Dept. Biotechnology, Govt. of India
- The Swarnajayanti Fellowship** (Govt. of India) (2005-2010)  
India's "Golden Jubilee" award for young scientists

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| 9. The <b>Wellcome Trust Senior Research Fellowship</b>                            | 1999-2006      |
| 10. AMBO International Training Fellowship   | 2000           |
| 11. Scholarship Award<br>Women's Council of the Brain Research Foundation, Chicago | 1995, '97, '99 |
| 12. <b>International Fellowship</b><br>American Association of University Women    | 1996           |

**Memberships:**

Member, Ethics Committee of the Soc. for Neuroscience	2014-present
Member, Scientific Publications Committee of the Soc. for Neuroscience	2012-2015
Member, F1000	2012-present
Member, F1000 Research Editorial Board	2012-present
Member, Asia Pacific Regional Committee (APRC) of the IBRO (International Brain Research Organization)	2011-present
Fellow, National Academy of Sciences, India (Council Member 2012-2015)	2010-present
Fellow, Indian Academy of Sciences, India	2010-present
Member, International Affairs Committee, American Society for Cell Biology	2009- present
Member, Society for Neuroscience, USA	1991-present

**Current Lab members:**

Post Doctoral Fellows:

Dr. Disha Chauhan	
Dr. Swetha Godavarthi	
Dr. Mallika Chatterjee	<b>(Wellcome Trust-DBT India Alliance Early Career Fellow 2013)</b>
Dr. Geeta Godbole	<b>(Wellcome Trust-DBT India Alliance Early Career Fellow 2012)</b>
Dr. M. Bhavana	<b>(Wellcome Trust-DBT India Alliance Early Career Fellow 2011)</b>

PhD students: Veena Kinare (collaborative student with Prof. Rajadhyaksha, Sophia College)  
Suranjana Pal

MSc students: Zeba Khatri  
Basabdatta Roy  
Ritika Gupta

**Post Doctoral researchers supervised in previous years (came from; current position)**

Dr. Nandini Gokulchandran	(MD-Nagpur Medical College; Research Scientist, Neurogen, Mumbai)
Dr. Vishakha Mangale	(PhD- NIRR, Mumbai; Research Scientist, GE Healthcare, Bangalore)
Dr. Alfredo Socorro	(PhD- ULL, Spain; Post doc with Gundela Meyer, ULL, Spain)
Dr. Ben Martynoga	(PhD- U. Edinburgh, UK; Post doc with Francois Guillemot, MRC, UK)

### **Students Graduated from the Tole lab (current position)**

<b>PhD</b>	Bhaskar Saha	(PhD 2006; Faculty at St. Xavier's College, Mumbai)
<b>PhD</b>	Hari Padmanabhan	(PhD 2008; postdoc with Jeff Macklis, Harvard Medical School)
<b>PhD</b>	Lakshmi Subramanian	(PhD 2008; postdoc with Arnold Kriegstein, UCSF)
<b>PhD</b>	Anindita Sarkar	(PhD 2012; postdoc with Fred Gage, Salk Institute)
<b>PhD</b>	Dhananjay Huilgol	(PhD 2012; postdoc with Josh Huang, CSHL)
<b>PhD</b>	Achira Roy	(PhD 2013; postdoc with Kathy Millen, U. Washington)
<b>PhD</b>	Ashwin Shetty	(PhD 2013; postdoc with Paola Arlotta, Harvard University)
<b>MSc:</b>	Upasana Maheshwari	(MSc 2014; Phd Student at FMI, Basel, Switzerland)
	Dhananjay Chaturvedi	(MSc 2008; PhD student at U. Texas, Dallas)
	R.V. Satyaki	(MSc 2007; PhD student in Cornell University)
	Aditi Falnikar	(MSc 2006; PhD student in Drexel University)
	Mugdha Deshpande	(MSc 2006; PhD student in U. Texas, Austin)
	Ryan Remedios	(MSc 2005; PhD MPI, Tuebingen; postdoc with David Anderson, Caltech)
	Vanisha Lakhina	(MSc 2004; PhD student in University of Pennsylvania; postdoc Princeton University)
	Lakshmi Subramanian	(MSc 2004; PhD 2008, TIFR; currently post doc at UCSF)
	Aditee Vyas	(MSc 2002; PhD 2006, IGBMC, France Currently Research Scientist at Nicholas Piramal, Mumbai)
	Sarada Bulchand	(MSc 2002; PhD and postdoc TLL, Singapore; Currently Scientific Communications Officer, TIFR, Mumbai)

## Publications

# corresponding author

1. Shetty AS, Godbole G, Maheshawari U, Padmanabhan H, Chaudhary R, Muralidharan B, Hou P-S, Monuki ES, Kuo H-C, V Rema, **Tole S<sup>#</sup> (2013)** Lhx2 regulates a cortex-specific mechanism for barrel formation [PNAS](https://doi.org/10.1073/pnas.1311158110)doi:10.1073/pnas.1311158110
2. Roy A, De Melo J, Chaturvedi D, Thien T, Cabrera-Socorro A, Houart C, Meyer G, Blackshaw S, **Tole S<sup>#</sup> (2013)** Lhx2 is necessary for the maintenance of optic identity and progression of optic morphogenesis [Journal of Neuroscience](https://doi.org/10.1523/JNEUROSCI.3316-13.2013)33(16):6877-84
3. Huilgol D, Udin, S, Shimogori T, Saha B, Roy A, Aizawa S., Hevner RF, Meyer G., Ohshima T, Pleasure SJ, Zhao Y, **Tole S<sup>#</sup> (2013)** Dual origins of the mammalian accessory olfactory bulb revealed by an evolutionarily conserved migratory stream [Nature Neuroscience](https://doi.org/10.1016/j.neuroscience.2013.01.045) 16(2):157-65
4. Roy A, Gonzalez M, Pierani A, Meyer G, **Tole S<sup>#</sup> (2013)** Lhx2 regulates the development of the forebrain hem system [Cerebral Cortex](https://doi.org/10.1093/cercor/bhs421)10.1093/cercor/bhs421
5. Falnikar A, **Tole S**, Liu M, Liu JS, and Baas PW. Polarity in migrating neurons is related to a mechanism analogous to cytokinesis (2013) [Current Biology](https://doi.org/10.1016/j.cub.2013.01.015) 23(13):1215-20
6. Harel I, Maezawa Y, Avraham R, Rinon A, Ma HY, Cross J, Leviatan N, Hegesh JT, Roy A, Jacob J, Rechavi G, Carvajal J, **Tole S**, Kioussi C, Quaggin S, Tzahor E. (2012) Pharyngeal Mesoderm Regulatory Network Controls Cardiac and Head Muscle Morphogenesis [PNAS](https://doi.org/10.1016/j.pnas.2012.09.258)109(46):18839-44
7. Marcos-Mondéjar P, Peregrín S, Li JY, Carlsson L, **Tole S**, López-Bendito, G. The Lhx2 Transcription Factor Controls Thalamocortical Axonal Guidance by Specific Regulation of Robo1 and Robo2 Receptors. (2012) [Journal of Neuroscience](https://doi.org/10.1523/JNEUROSCI.3243-12.2012), 32:4372-4385
8. Subramanian L, Sarkar A, Ashwin S, Muralidharan B, Hari P, Piper M, Monuki ES, Bach I, Gronostajski R, Richards R, and **Tole, S<sup>#</sup> (2011)** Transcription factor Lhx2 is necessary and sufficient to suppress astroglialogenesis and promote neurogenesis in the developing hippocampus. [PNAS](https://doi.org/10.1073/pnas.1101109108)www.pnas.org/cgi/doi/10.1073/pnas.1101109108
9. Desouza LA, Sathanoori M, Kapoor R, Rajadhyaksha N, Gonzalez LE, Kottmann AH, **Tole S**, Vaidya VA. (2011) Thyroid hormone regulates the expression of the sonic hedgehog signaling pathway in the embryonic and adult Mammalian brain [Endocrinology](https://doi.org/10.1210/en.2011-0005) 152(5):1989-2000.
10. Falnikar A, **Tole S**, Baas PW. (2011) Kinesin-5, mitotic microtubule-associated motor protein, modulates neuronal migration [Mol Biol Cell](https://doi.org/10.1093/molbio/mbq015)22(9):1561-74.
11. Piper M, Barry G, Hawkins J, Mason S, Lindwall C, Little E, Sarkar A, Smith AG, Moldrich RX, Boyle GM, **Tole S**, Gronostajski RM, Bailey TL, and Richards LJ. NFIA Controls Telencephalic Progenitor Cell Differentiation through Repression of the Notch Effector Hes1. (2010) [J. Neuroscience](https://doi.org/10.1523/JNEUROSCI.3091-10.2010)30:9127–9139

12. Mangale VS, Hirokawa KE, Satyaki PRV, Gokulchandran N, Chikbire S, Subramanian L, Shetty AS, Martynoga B, Paul J, Mai MV, Li Y, Flanagan LA, **Tole S<sup>#</sup>**, and Monuki ES<sup>#</sup> (2008) Lhx2 selector activity specifies cortical identity and suppresses hippocampal organizer fate [Science](#) 319: 304-309 # co-corresponding authors
- “Perspectives” based on this paper: E. A. Grove “Organizing the Source of Memory” [Science](#) (319) 288-289*
- A highlight based on this paper: M. H. Flight “Instructions for the Hippocampus” [Nature Reviews Neuroscience](#) 9 (3): 164-165*
13. Hari P, Deshpande M, Sharma N, Rajyadhaksha N, Ramkumar N, Kimura, K., Rodrigues V<sup>#</sup>, **Tole S<sup>#</sup>**. (2008) Chip is required for post-eclosion behaviour in Drosophila. [J. Neuroscience](#) 28:9145-50. # co- corresponding authors
14. Barry G, Piper M, Lindwall C, Moldrich R, Mason S, Little E, Sarkar A, **Tole S**, Gronostajski RM, Richards LJ. (2008) Specific glial populations regulate hippocampal morphogenesis. [Journal of Neuroscience](#). (28):12328-40.
15. Remedios, R., Huilgol, D., Saha, B., Hari, P., Bhatnagar, L., Kowalczyk T., Hevner R. F., Suda Y., Aizawa S., Ohshima, T., Stoykova, A., **Tole, S<sup>#</sup>**. (2007) A novel stream of amygdaloid cells from the caudal telencephalon reveals a developmental link between the amygdala and the neocortex [Nature Neuroscience](#) 10 (9): 1141–1150
- “News and Views” based on this paper: J. M. Deussing and W. Wurst “Amygdala and Neocortex: Common Origins and Shared Mechanisms” [Nature Neuroscience](#) 10 (9): 1081-1082*
16. Saha, B. Hari P., Huilgol, D. and **Tole, S<sup>#</sup>**. (2007) Dual role for LIM-HD gene Lhx2 in the formation of the lateral olfactory tract (LOT) [Journal of Neuroscience](#) 27: 2290-2297
17. Lakhina, V., Falnikar, A., Bhatnagar, L., **Tole, S<sup>#</sup>**. (2007) Early thalamocortical tract guidance and topographic sorting of thalamic projections requires LIM- homeodomain gene Lhx2 [Developmental Biology](#) 306(2) 703-713.
18. **Tole, S<sup>#</sup>**, Gutin, G., Bhatnagar, L., Remedios, R., Hebert, J. # (2006) Development of midline cell types and commissural axon tracts requires Fgfr1 in the cerebrum. [Developmental Biology](#), 289: 141 – 151 # co-corresponding authors
19. **Tole, S<sup>#</sup>**, Remedios, R., Saha, B., Stoykova, A. # (2005) Differential roles of Pax6 and Emx2 in the development of the amygdaloid complex. [Journal of Neuroscience](#), 25(10):2753–2760. # co-corresponding authors
20. Banerjee, S. B., Rajendran, R., Dias, B. G., Ladiwala, U., **Tole, S.**, Vaidya, V. A. (2005) Recruitment of the Sonic Hedgehog signaling cascade in electroconvulsive seizure mediated regulation of adult hippocampal neurogenesis. [European Journal of Neuroscience](#), 22: 1570-80
21. Remedios, R., Subramanian, L., **Tole S<sup>#</sup>**. (2004) LIM genes parcellate the embryonic amygdala and regulate its development. [Journal of Neuroscience](#), 24(31):6986-6990.
22. Vyas, A., Saha, B., Lai, E., **Tole, S<sup>#</sup>**. (2003) The Paleocortex is specified in mice in which dorsal telencephalic patterning is severely disrupted. [Journal of Comparative Neurology](#), 466:545-553

23. Oh, L.Y.S., Denninger, J. S., Colvin, J., Vyas, A., **Tole, S.** Ornitz, D. M., and Bansal, R. (2003) Fibroblast Growth Receptor-3 signaling regulates the onset of oligodendrocyte terminal differentiation. [Journal of Neuroscience](#)23(3): 883-894
24. Bansal, R.<sup>#</sup>, Lakhina,V., RemediosR., **Tole, S.**<sup>#</sup>(2003) Expression of FGF Receptors 1, 2, and 3 in the Embryonic And Postnatal Mouse Brain compared with Pdgfra, Olig2, and PLP/DM20: Implications for Oligodendrocyte Development. [Developmental Neuroscience](#), 25: 83-95.  
<sup>#</sup>*co-corresponding authors*
25. Bulchand, S., Subramanian, L., and **Tole, S.**<sup>#</sup>. (2003) Dynamic spatio-temporal expression of LIM genes and co-factors in the embryonic and postnatal cerebral cortex. [Developmental Dynamics](#), 226(3):460-469.

26. Bulchand, S., Grove, E. A., Porter, F. D., and **Tole, S.** (2001)<sup>#</sup>. LIM-homeodomain gene Lhx2 regulates the formation of the cortical hem. [Mechanisms of Development](#), 100(2) 165-175.

*The publications above represent work from Dr. Tole's lab at TIFR*

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*The publications below represent work during Dr. Tole's PhD and post doc*

27. **Tole, S.** and Grove, E. A. (2001) Detailed field pattern is intrinsic to the embryonic mouse hippocampus early in neurogenesis. [Journal of Neuroscience](#), 21(5): 1580-1589.
28. **Tole, S.** Goudreau, G., Assimacopoulos, S. and Grove E.A. (2000). Emx2 is required for the growth of the hippocampus but not for hippocampal field specification. [Journal of Neuroscience](#) 20(7) 2618-2625.
29. **Tole, S.**, Ragsdale, C. W., and Grove, E. A. (2000). Dorsoventral patterning of the telencephalon is disrupted in the mouse mutant extra-toesJ. [Developmental Biology](#) 217 (2) 254-265.
30. Lee, S. M. K., **Tole, S.**, Grove, E. A., and McMahon, A. P. (2000)A local Wnt-3a signal is required for development of the mammalian hippocampus. [Development](#) 127 (3) 457-467.
31. Grove, E. A. and**Tole, S.** (1999). Patterning events and specification signals in the developing hippocampus. [Cerebral Cortex](#) 9 (6) 551-561.
32. Grove, E. A., **Tole, S.**, Limon J., Yip, L-W., and Ragsdale, C. W. (1998). The hem of the embryonic cerebral cortex is defined by the expression of multiple *Wnt* genes and is compromised in *Gli3*-deficient mice. [Development](#). 125 (12) 2315-2325.
33. **Tole, S.**, Christian,C. and Grove, E. A. (1997). Early specification and autonomous development of cortical fields in the mouse hippocampus. [Development](#). 124 (24) 4959-4970.
34. **Tole, S.**, Kaprielian, Z., Ou, S., Patterson, P. H. (1995) FORSE-1: A positionally-regulated epitope in the developing rat central nervous system. [Journal of Neuroscience](#) 15: 957-969.
35. **Tole, S.**, and Patterson, P. H. Regionalization of the developing forebrain: a comparative study of FORSE-1, Dlx-2 and BF-1. (1995) [Journal of Neuroscience](#) 15: 970-980.
36. **Tole, S.**, and Patterson, P.H. (1993). Distribution of CD9 in the developing and mature rat nervous system. [Developmental Dynamics](#) 197:94-106.

## Reviews

1. Chatterjee M, Huilgol D, **Tole S<sup>#</sup>**. Building the Body, Building the Brain (2012) *Journal of the Indian Institute of Science* 92 (4): 369-376
2. Subramanian L, and **Tole S<sup>#</sup>**. (2009) Mechanisms underlying the specification, positional regulation and function of the cortical hem. ***Cerebral Cortex*** 19 (Suppl 1):i90-5.
3. Subramanian L, Remedios, R, Shetty, AS, and **Tole S<sup>#</sup>**. (2009) Signals from the Edges: The Cortical Hem and Antihem in telencephalic development. ***Seminars in Cell and Developmental Biology*** 20(6):712-8
4. Subramanian, L., Lakhina, V., Padmanabhan, H., and **Tole, S<sup>#</sup>**. (2003) Specification of cell identity in development: Role of LIM genes. ***Proc. Indian Natl. Sci. Acad.*** B69 5: 805-826.

## Editorial:

1. **Tole S.** and Vale, R. (2010). Young leaders for Biology in India. ***Science*** 329: 1441. (Editorial)

## Book Chapter:

1. **Tole S.** and Hebert J. Telencephalon Patterning. "Cellular Migration and Formation of Neuronal Connections: Comprehensive Developmental Neuroscience" (2013) John Rubenstein and Pasko Rakic (Eds). Academic Press. ISBN: 978-0-12-397265-1

## F1000 Recommendations

Shetty AS and **Tole S** <http://f1000.com/717952889>

Shetty AS and **Tole S** <http://f1000.com/prime/14264140>

**Tole S** and Huilgol D <http://f1000.com/prime/718122719>

## Blogs:

Scientist and Mommy <http://www.indiabioscience.org/article/shubha-tole>

How to choose which institution or which lab to join? <http://www.indiabioscience.org/node/778>

One possible plug for the leaky pipeline <http://www.indiabioscience.org/node/327>

Are we doing enough? <http://www.indiabioscience.org/node/245>

How are we viewing collaborations? <http://www.indiabioscience.org/node/166>

Advice for students starting out in research <http://www.indiabioscience.org/node/159>

Taking the "ME" out of Mentorship <http://www.indiabioscience.org/node/9768>