

Dr. Parijat Sarkar

Postdoctoral Fellow

Department of Biochemistry

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Education

- April 2021 **Ph.D. (Life Sciences)** January 2014-March 2021
CSIR-Centre for Cellular and Molecular Biology (CCMB), Hyderabad, India
Thesis title: *Interplay between Membrane Lipids, Actin Cytoskeleton and GPCRs: Organization, Dynamics and Function*
Thesis advisor: Prof. Amitabha Chattopadhyay
- July 2013 **Integrated BS-MS (Biological Sciences)**
Bachelor of Science (BS): August 2008-July 2010
Master of Science (MS): August 2010- July 2013
Indian Institute of Science Education and Research Kolkata (IISER Kolkata), India
CGPA-9.21/10 (Director's Gold Medal).
Thesis title: *Studies on the Role Played by Ribosome During Cold Stress in Bacteria*
Dissertation thesis advisor: Dr. Partha Pratim Datta

Professional positions

- Postdoctoral Scholar (June 2022-present), Prof. Rajat Rohatgi's lab, Department of Biochemistry, Stanford University School of Medicine, USA
- Senior Project Associate (Feb 2021-May 2022), CSIR-Centre for Cellular and Molecular Biology (CCMB), India
- Senior Research Fellow (Jan 2016- Jan 2021), CSIR-Centre for Cellular and Molecular Biology (CCMB), India
- Junior Research Fellow (Jan 2014- Dec 2015), CSIR-Centre for Cellular and Molecular Biology (CCMB), India

Honors and awards

- **NASI Young Scientist Platinum Jubilee Award 2021** in Bio-Medical, Molecular Biology and Biotechnology
- **Sun Pharma Science Scholar Award-2018 in Biomedical Sciences** for doctoral research by Sun Pharma Science Foundation, Sun Pharmaceutical Industries Ltd., India
- Outstanding poster presentation award in Hy-Sci 2019, CCMB, Hyderabad, India
- **Grant awarded by Avanti Polar Lipids** and **Full foreign travel grant awarded by Council of Scientific & Industrial Research (CSIR), India** to participate in Joint EMBO-FEBS Advanced Lecture Course on 'Biomembranes: Molecular Architecture, Dynamics and Function', Corsica, at France during 12-21 June, 2017
- **FEBS Youth Travel Fund** for participating in FEBS advanced course on 'Lipid-protein interactions and organelle function' at Spetses Island, Greece during September 1-8, 2016

- **Anindya Kumar Ghosh Memorial Award** for the **Best Student Seminar (2014-2015)**, CSIR-CCMB, Hyderabad, India, 2015
- **Dr. Shyama Prasad Mukherjee Fellowship** by CSIR, Human Resource Development Group, India (2014-2019)
- **Director's Gold Medal** for 1st rank in Department of Biological Sciences after 5 years Integrated BS-MS course at IISER, Kolkata, India, 2013
- **CNR Rao Foundation Prize** Certificate for securing the highest marks in the first semester of Integrated BS-MS course at IISER, Kolkata
- Visiting Students' Research Programme 2012 at Tata Institute of fundamental Research, Mumbai, India, 2012
- **DAAD WISE Scholarship**, 2011
- IAS (Indian Academy of Sciences) Scholarship SRF (Summer Research Fellowship), 2010, 2011 and 2012
- INSPIRE, Department of Science and Technology, India, (2008-2013)
- Awarded Certificate of Merit by West Bengal Board for Secondary Education, India, 2007

Publications (27 as first author (18 experimental and 9 reviews/book chapter))

1. **Sarkar, P.**, and Chattopadhyay, A. (2023) Statin-induced Increase in Actin Polymerization Modulates GPCR Dynamics and Compartmentalization. *Biophysical Journal* (DOI: 10.1016/j.bpj.2022.08.039)
2. Kumar, A., **Sarkar, P.**, and Chattopadhyay, A. (2023) Metabolic Depletion of Sphingolipids Inhibits Agonist-induced Endocytosis of the Serotonin_{1A} Receptor. *Traffic* 24: 95-107.
3. **Sarkar, P.**, Kumar, G.A., Shrivastava, S., and Chattopadhyay, A. (2022) Chronic Cholesterol Depletion Increases F-actin Levels and Induces Cytoskeletal Reorganization via a Dual Mechanism. *Journal of Lipid Research* 63: 100206. (*Featured on the cover*)
4. **Sarkar, P.**, Bhat, A., and Chattopadhyay, A. (2022) Lysine 101 in the CRAC Motif in Transmembrane Helix 2 Confers Cholesterol-induced Thermal Stability to the Serotonin_{1A} Receptor. *The Journal of Membrane Biology* 255:739-746
5. Shrivastava, S.[†], **Sarkar, P.**[†], Preira, P., Salomé, L., and Chattopadhyay, A. (2022) Cholesterol-dependent Dynamics of the Serotonin_{1A} Receptor utilizing Single Particle Tracking: Analysis of Diffusion Modes. *Journal of Physical Chemistry B* 126: 6682-6690 ([†]*equal contribution*; *Featured on the cover*)
6. Shahi, G., Kumar, M., Khandelwal, N.K., Banerjee, A., **Sarkar, P.**, Kumari, S., Esquivel, B.D., Chauhan, N., Chattopadhyay, A., White, T.C., Gaur, N.A., Singh, A., and Prasad, R. (2022) Inositol phosphoryl transferase, Ipt1, is a critical determinant of azole resistance and virulence phenotypes in *Candida glabrata*. *Journal of Fungi* 8: 651.
7. **Sarkar, P.**, and Chattopadhyay, A. (2022) Membrane Dipole Potential: An Emerging Approach to Explore Membrane Organization and Function. *Journal of Physical Chemistry B* 126: 4415-4430 (*Invited Feature Article*; *Featured on the cover*).
8. Datta, A.,[†] **Sarkar, P.**,[†] Shrivastava, S., Chattopadhyay, A. (2022) Effect of Hypoxia on the Function of the Human Serotonin_{1A} Receptor. *ACS Chemical Neuroscience* 13: 1456-1466. ([†]*equal contribution*)
9. Kumar, G.A.,[†] **Sarkar, P.**,[†] Stepniewski, T.M.,[†] Jafurulla, M., Singh, S.P., Selent, J., Chattopadhyay, A. (2021) A Molecular Sensor for Cholesterol in the Human Serotonin_{1A} Receptor. *Science Advances* 7, eabh2922 ([†]*equal contribution*; *Recommended in F1000 prime (Faculty Opinions)*).
10. **Sarkar, P.**, and Chattopadhyay, A. (2021) Cholesterol in GPCR Structures: Prevalence and Relevance. *The Journal of Membrane Biology* 255: 99-106 (*Featured on the cover*)
11. **Sarkar, P.**, and Chattopadhyay, A. (2021) Cholesterol Footprint in High-Resolution Structures of Serotonin Receptors: Where are We Now and What Does It mean? *Chemistry and Physics of Lipids* 239: 105120.

12. Rao, B.D., **Sarkar, P.**, and Chattopadhyay, A. (2021) Metabolic Depletion of Sphingolipids Does not Alter Cell Cycle Progression in Chinese Hamster Ovary Cells. *The Journal of Membrane Biology* 255: 1-12.
13. **Sarkar, P.**, Harikumar, K.G., Rawat, S.S., Das, S., Chakraborty, T.K., and Chattopadhyay, A. (2021) Environment-sensitive Fluorescence of 7-Nitrobenz-2-oxa-1,3-diazol-4-yl (NBD)-labeled Ligands for Serotonin Receptors. *Molecules* 26: 3848.
14. Rao, B.D.,[†] **Sarkar, P.**,[†] Chattopadhyay, A. (2021) Effect of Tertiary Amine Local Anesthetics on G Protein-coupled Receptor Lateral Diffusion and Actin Cytoskeletal Reorganization. *Biochimica et Biophysica Acta – Biomembranes* 1863: 183547. ([†][equal contribution](#))
15. Kumar, A., **Sarkar, P.**, and Chattopadhyay, A. (2021) Metabolic Depletion of Sphingolipids Reduces Serotonin_{1A} Receptor Expression on the Cell Surface due to Impaired Trafficking. *ACS Chemical Neuroscience* 12: 1189-1196.
16. **Sarkar, P.**, Chattopadhyay, A. (2021) Insights into Cellular Signaling from Membrane Dynamics. *Archives of Biochemistry and Biophysics* 701: 108794.
17. **Sarkar, P.**, Mozumder, S., Bej, A., Mukherjee, S., Sengupta, J., Chattopadhyay, A. (2021) Structure, Dynamics and Lipid Interactions of Serotonin receptors: Excitements and Challenges. *Biophysical Reviews* 13: 101-122.
18. **Sarkar, P.**, Jafurulla M., Bhowmick, S., Chattopadhyay, A. (2020) Structural Stringency and Optimal Nature of Cholesterol Requirement in the Function of the Serotonin_{1A} Receptor. *The Journal of Membrane Biology* 253: 445-457.
19. Fatakia, S.N., **Sarkar, P.**, Chattopadhyay, A. (2020) Molecular Evolution of a Collage of Cholesterol Interaction Motifs in Transmembrane Helix V of the Serotonin_{1A} Receptor. *Chemistry and Physics of Lipids* 232: 104955.
20. **Sarkar, P.**, Rao, B.D., Chattopadhyay, A. (2020) Cell Cycle Dependent Modulation of Membrane Dipole Potential and Neurotransmitter Receptor Activity: Role of Membrane Cholesterol. *ACS Chemical Neuroscience* 11: 2890-2899.
21. **Sarkar, P.**, Chattopadhyay, A. (2020) Exploring Membrane Lipid and Protein Diffusion by FRAP, in Analysis of Membrane Lipids (Prasad, R., and Singh, A., Eds.), pp. 119-141. ([Featured on the cover](#))
22. Rao, B.D.,[†] **Sarkar, P.**,[†] Chattopadhyay, A. (2020) Selectivity in Agonist and Antagonist Binding of Serotonin_{1A} Receptors via G-protein Coupling. *Biochimica et Biophysica Acta – Biomembranes* 1862: 183265. ([†][equal contribution](#))
23. Shrivastava, S.,[†] **Sarkar, P.**,[†] Preira, P., Salomé, L., Chattopadhyay, A. (2020) Role of Actin Cytoskeleton in Dynamics and Function of the Serotonin_{1A} Receptor. *Biophysical Journal* 118: 944-956. ([†][equal contribution](#))
24. **Sarkar, P.**, Chattopadhyay, A. (2020) Cholesterol Binding Motifs in G Protein-coupled Receptors: Slippery Hot Spots? *Wiley Interdisciplinary Reviews: Systems Biology and Medicine*. 2020: e1481.
25. Sahu, S.S., **Sarkar, P.**, Shrivastava, S., Chattopadhyay, A. (2020) Differential Effects of Simvastatin on the Organization and Dynamics of Membranes of Varying Phase. *Chemistry and Physics of Lipids* 225: 104831.
26. **Sarkar, P.**, Chattopadhyay, A. (2019) Exploring Membrane Organization at Varying Spatiotemporal Resolutions: Implications in Membrane Biology. *Physical Chemistry Chemical Physics* 21: 11554-11563.
27. Kumar, G.A., **Sarkar, P.**, Jafurulla, M., Singh, S.P., Srinivas, G., Pande, G., Chattopadhyay, A. (2019) Exploring Endocytosis and Intracellular Trafficking of the Human Serotonin_{1A} Receptor. *Biochemistry* 58: 2628-2641. ([Featured on the cover](#))
28. Fatakia, S.N., **Sarkar, P.**, Chattopadhyay, A. (2019) A Collage of Cholesterol Interaction Motifs in the Serotonin_{1A} Receptor: An Evolutionary Implication for Differential Cholesterol Interaction. *Chemistry and Physics of Lipids* 221: 184-192.

29. **Sarkar, P.**, Kumar, G.A., Pal, S., Chattopadhyay, A. (2018) Biophysics of Serotonin and Serotonin_{1A} Receptor: Fluorescence and Dynamics, in Serotonin: A Mediator that Spans Evolution (Pilowsky, P., Ed.), Elsevier, Amsterdam pp. 3-22.
30. Khandelwal, N.K.,[†] **Sarkar, P.**,[†] Gaur, N.A., Chattopadhyay, A., Prasad, R. (2018) Phosphatidylserine Decarboxylase Governs Plasma Membrane Fluidity and Impacts Drug Susceptibilities of *Candida albicans* Cells. *Biochimica et Biophysica Acta – Biomembranes* 1860: 2308-2319. ([†equal contribution](#))
31. **Sarkar, P.**, Chattopadhyay, A. (2018) GFP Fluorescence: A Few Lesser-Known Nuggets That Make It Work. *Journal of Biosciences* 43: 421-430. ([Featured on the cover](#))
32. Pal, S., Aute, R., **Sarkar, P.**, Bose, S., Bose, S., Deshmukh, M.V., Chattopadhyay, A. (2018) Constrained Dynamics of the Sole Tryptophan in the Third Intracellular Loop of the Serotonin_{1A} Receptor. *Biophysical Chemistry* 240: 34-41.
33. Khandelwal, N.K., Chauhan, N., **Sarkar, P.**, Esquivel, B.D., Coccetti, P., Singh, A., Coste, A.T., Gupta, M., Sanglard, D., White, T.C., d'Enfert, C., Chattopadhyay, A., Mondal, A.K., Prasad, R. (2018) Azole resistance in a *Candida albicans* mutant lacking the ABC transporter *CDR6/ROA1* depends on TOR signaling. *Journal of Biological Chemistry* 293: 412-432.
34. **Sarkar, P.**, Chattopadhyay, A. (2017) Solubilization of Serotonin_{1A} Receptor Monitored using Membrane Dipole Potential. *Chemistry and Physics of Lipids* 209: 54-60.
35. **Sarkar, P.**, Chakraborty, H., Chattopadhyay, A. (2017) Differential Membrane Dipolar Orientation Induced by Acute and Chronic Cholesterol Depletion. *Scientific Reports* 7: 4484.
36. **Sarkar, P.**, Chattopadhyay, A. (2016) Micellar Dipole Potential is Sensitive to Sphere-to-Rod Transition. *Chemistry and Physics of Lipids* 195: 34-38.
37. **Sarkar, P.**, Chattopadhyay, A. (2015) Dipolar Rearrangement During Micellization Explored using A Potential-sensitive Fluorescent Probe. *Chemistry and Physics of Lipids* 191: 91-95.

Manuscripts under preparation

1. **Sarkar, P.**, Chattopadhyay, A. Role of Cholesterol and the Actin Cytoskeleton in Serotonin_{1A} Receptor Signaling: Insights from Chronic Cholesterol Depletion.
2. **Sarkar, P.**, Soleimaninejd, H., Smith, T.A, Chattopadhyay, A. Reorganization of Actin Labeled with NBD-Phalloidin upon Chronic Cholesterol Depletion.
3. **Sarkar, P.**, Soleimaninejd, H., Smith, T.A, Chattopadhyay, A. Cholesterol-dependent Conformational Plasticity of the Serotonin_{1A} Receptor Explored using FLIM.

Poster presentations

1. **Sarkar, P.**, and Chattopadhyay, A. Membrane-cytoskeleton Interaction Shapes GPCR Dynamics and Function, at International Symposium on Cell Surface Macromolecules, February 17-20, 2020, IISER Pune, India. p. 81.
2. **Sarkar, P.**, and Chattopadhyay, A. Membrane-cytoskeleton Interaction Shapes GPCR Dynamics and Function, at 'Hy-Sci 2019', August 29, 2019, CCMB, Hyderabad. p.27. (**Best poster award**).
3. **Sarkar, P.**, and Chattopadhyay, A. Chronic Cholesterol Induced F-actin Polymerization leads to Dynamic Confinement of the Serotonin_{1A} Receptor in Live Cells, at 'National Workshop on Fluorescence and Raman Spectroscopy', November 12-17, 2018, New Delhi, India. p. 125.
4. **Sarkar, P.**, Kumar, G.A., Shrivastava, S., Chattopadhyay, A. Membrane Cholesterol and Actin Cytoskeleton: A Dual Mechanism of Regulation, at the International Congress of Cell Biology (ICCB-2018), January 27-31, 2018, CCMB, Hyderabad, India. p. 293.
5. **Sarkar, P.**, Kumar, G.A., Shrivastava, S., Chattopadhyay, A. Membrane Cholesterol and Actin Cytoskeleton: A Dual Mechanism of Regulation, at Joint EMBO-FEBS Advanced Lecture Course on

Biomembranes: Molecular Architecture, Dynamics and Function, June 12-21, 2017, Corsica, France. p. 124.

6. **Sarkar, P.**, Chakraborty, H., Chattopadhyay, A. Differential Membrane Dipolar Orientation Induced by Acute and Chronic Cholesterol Depletion, at 11th International Symposium on Cell Surface Macromolecules, February 24-28, 2017, IISER Mohali, India. p. 17.
7. **Sarkar, P.**, Kumar, G.A., Shrivastava, S., Lakshmi, V.V.S., Prabhakar, S., Chattopadhyay, A. Membrane Cholesterol and Actin Cytoskeleton: A Dual Mechanism of Regulation, at FEBS advanced course on "Lipid-protein interactions and organelle function", September 1-8, 2016, Spetses Island, Greece. p. 54.
8. **Sarkar, P.**, Kumar, G.A., Shrivastava, S., Lakshmi, V.V.S., Prabhakar, S., Chattopadhyay, A. Membrane Cholesterol and Actin Cytoskeleton: A Dual Mechanism of Regulation, at Optics Within Life Sciences (OWLS-2016), March 16-19, 2016, Tata Institute of Fundamental Research, Mumbai, India. p. 162.
9. **Sarkar, P.**, Datta P.P. Can Ribosome act as a thermosensor? 1st Department of Biological Sciences Department Day, March 6, 2013, IISER Kolkata, India (**Best poster award**).

Oral presentations

1. Flash talk at Hy-Sci 2019, CCMB, Hyderabad, India, August 29, 2019
2. CCMB Founder's day, CCMB, Hyderabad, India, February 22, 2019
3. CSIR-CCMB 31st Foundation day student symposium, CCMB, Hyderabad, India, November 26, 2018
4. 11th International Symposium on Cell Surface Macromolecules, IISER Mohali, India, February 24-28, 2017
5. Discussion meeting on Biological membranes, Department of Chemical Engineering, Indian Institute of Science, Bangalore, India, November 18-19, 2015

Abstracts

1. Rao, B.D,[†] **Sarkar, P.**,[†] Chattopadhyay, A. Cell Cycle Dependent Modulation of Membrane Dipole Potential: Correlation with membrane cholesterol Content, at the 12th International Symposium on Cell Surface Macromolecules, February 17-21, 2020, IISER Pune, India. p. 57. (**†equal contribution**)
2. Kumar, G.A.,[†] **Sarkar, P.**,[†] Jafurulla, M., Singh, S.P., Bandari, S., Paniccker, M.M., Chattopadhyay, A. Molecular Determinants of Cholesterol Sensitivity of serotonin_{1A} Receptor Function: CRACKing the Code, at the 12th International Symposium on Cell Surface Macromolecules, February 17-21, 2020, IISER Pune, India. p. 61. (**†equal contribution**)
3. Sahu, S.S., **Sarkar, P.**, Shrivastava, S., Chattopadhyay, A. Differential Effects of Simvastatin on the Organization and Dynamics of Membranes of Varying Phase, at the 12th International Symposium on Cell Surface Macromolecules, February 17-21, 2020, IISER Pune, India. p. 99.
4. Rao, B.D,[†] **Sarkar, P.**,[†] Chattopadhyay, A. Cell Cycle Dependent Modulation of Membrane Dipole Potential: Correlation with Membrane Cholesterol Content, at 'Hy-Sci 2019', CCMB, Hyderabad, August 29, 2019. p.24 (**†equal contribution**)
5. Rao, B.D,[†] **Sarkar, P.**,[†] Chattopadhyay, A. Selectivity in Agonist and Antagonist Binding of Serotonin_{1A} Receptors *via* G-protein Coupling, at the International Congress of Cell Biology (ICCB-2018), January 27-31, 2018, CCMB, Hyderabad, India. p. 278. (**†equal contribution**)
6. Pal, S., Aute, R., **Sarkar, P.**, Bose, S., Deshmukh, M.V., Chattopadhyay, A. Constrained Dynamics of the Sole Tryptophan in the Third Intracellular Loop of the Serotonin_{1A} Receptor, at the International Congress of Cell Biology (ICCB-2018), January 27-31, 2018, CCMB, Hyderabad, India. p. 283.

7. Bose, S., Pal, S., **Sarkar, P.**, Aute, R., Deshmukh, M.V., Chattopadhyay, A. Motionally Restricted Tryptophan in the Third Intracellular Loop of the Serotonin_{1A} Receptor: Implications in GPCR Activation, at the Annual Symposium of the Indian Biophysical Society, 2017, IISER Mohali, India. p. 139.
8. Kumar, G.A., **Sarkar, P.**, Jafurulla, M., Srinivas, G., Pande, G., Chattopadhyay, A. Endocytosis and Trafficking of the Serotonin_{1A} Receptor: Implications in Neuropsychiatric Disorders, at 11th International Symposium on Cell Surface Macromolecules, February 24-28, 2017, IISER Mohali, India. p. 9.
9. Kumar, G.A., **Sarkar, P.**, Jafurulla, M., Srinivas, G., Pande, G., Chattopadhyay, A. Monitoring Endocytosis of the Serotonin_{1A} Receptor Utilizing A Quantitative Flow Cytometry Based Approach, at Joint FEBS-EMBO Advanced Lecture Course Biomembranes: Molecular Architecture, Dynamics and Function, June 15-25, 2015, Institut d'Etudes Scientifiques de Cargèse, Cargèse, France. p. 114.
10. Kumar, G.A., **Sarkar, P.**, Jafurulla, M., Srinivas, G., Pande, G., Chattopadhyay, A., Internalization and Trafficking of the Serotonin_{1A} Receptor: Insights from Quantitative Flow Cytometry and Confocal Microscopy, at Optics Within Life Sciences (OWLS-2016), March 16-19, 2016, Tata Institute of Fundamental Research, Mumbai, India. p. 103.

Society memberships

- Biophysical Society, U.S.A. (Student Member, membership # 86399)
- Fluorescence Society, India (Life Member, membership # 234)
- Society of Biological Chemists, India (Life Member, membership # 3337)
- Indian Biophysical Society (Life Member, membership # 907)
- Indian Society of Cell Biology (Life Member, membership #2016053)
- Electron Microscope Society of India (Life Member, membership # LM 913)