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**RESEARCH INTEREST:**

Physiologist and molecular biologist with expertise in epithelial ion transport and barrier function. My research interest centres on defining the molecular and cellular mechanisms that regulate epithelial ion and fluid transport in health and disease, with a particular emphasis on CFTR and bicarbonate transporters in epithelia.

During my PhD training in Physiology, I established a strong foundation in molecular and cellular physiology and investigated fundamental mechanisms governing epithelial ion transport and barrier function. My research focused on defining how epithelial ion transport and tight-junction signalling regulate barrier integrity during enteric infection like Shigellosis and on developing zinc-based therapeutic strategies to restore claudin-2 and claudin-4–dependent barrier function in acute inflammatory diarrheal disease.

Building on this expertise, my postdoctoral research focused on how ER–plasma membrane lipid nanodomains regulate CFTR and NBCe1-B through phosphatidylserine-dependent signalling and translating E-Syt3–ORP5–mediated lipid–ion transporter crosstalk into strategies to improve epithelial fluid and bicarbonate secretion in salivary and pancreatic ducts. My recent research focuses on elucidating how $Ca^{2+}$ and cAMP signalling pathways converge at endoplasmic reticulum–plasma membrane junctions to regulate the activity and trafficking of epithelial ion channels and transporters, including CFTR, NBCe1-B and STIM1 to coordinate lipids like PIP2 and PI4P transfer processes essential for channel gating and transporter function. By integrating whole-cell patch-clamp electrophysiology with advanced microscopy and cell-based molecular approaches, my work seeks to delineate signalling crosstalk mechanisms that control epithelial secretion and to define how their dysregulation contributes to diseases, particularly Sjögren's Syndrome, cystic fibrosis and pancreatitis.

**EXPERIENCE:**

National Institutes of Health — Bethesda, MD
National Institute of Dental and Craniofacial Research — September 2020-present
Visiting *Postdoctoral Fellow*
*Principal Investigator- Dr Shmuel Muallem, PhD.*

- Designed and executed core experiments on E-Syt3 regulation of CFTR and NBCe1-B.
- Performed electrophysiology (CFTR and NBCe1-B currents), siRNA-mediated knockdowns, lipid biosensor imaging (AiryScan, TIRF microscopy) and domain mutagenesis.
- Identified and purified CFTR lasso domain and NBCe1-B autoinhibitory domain as phosphatidylserine sensors and performed lipid pull down assays.
- Developed and applied transgenic overexpression and silencing of E-Syt3 in salivary glands of animal models to establish physiological relevance.
- Demonstrated functional antagonism between E-Syt3 and ORP5 in regulating epithelial ion transport.
- Coordinated multi-institutional collaborations (NIH, South Korea, Hungary) and integrated

findings across systems.
- Led data analysis, figure preparation, and initial manuscript drafting.

University of Calcutta; Department of Physiology — Kolkata, India
National Institute of Cholera and Enteric Disease, (ICMR) — July 2013- February 2020
DST INSPIRE Fellow (Doctoral)
Advisor- *Dr Mirajul Hoque Kazi, PhD.*

- Conceived and performed the core experiments of electrophysiology using Ussing chamber.
- Developed and utilized *in vitro* and *in vivo* infection models to study Shigella-induced epithelial barrier damage.
- Conducted immunofluorescence microscopy, Western blotting, and transepithelial resistance, assays to demonstrate zinc-mediated restoration of claudin-2 and claudin-4 localization at tight junctions.
- Analyzed data linking zinc therapy to improved barrier integrity and reduced pathogenesis in shigellosis.
- Designed and performed biofilm formation assays and systematically evaluated the role of gold nanoparticles in inhibiting and disrupting *Vibrio cholerae* biofilms.
- Drafted the manuscript and collaborated with co-authors on data interpretation and final revisions.

**Publications :**

1. A Junctional phosphatidylserine subdomain specified by E-Syt3/ORP5 assembles transporter complexes to determine epithelial transport. **Paramita Sarkar**, Benjamin Luscher, Zengyou ye, Woo Young Chung, Changyu Zheng, Mingoo Lee, Árpád Varga, Petra Pallagi, József Maléth, Malini Ahuja and Shmuel Muallem. **EMBO J** .2025 May 27.

2. Physiology of duct cell secretion. Wei-Yin Lin, **Paramita Sarkar**, and Shmuel Muallem. **The Pancreas**: An Integrated Textbook of Basic Science, Medicine, and Surgery, Fourth Edition (**2023**)48-55. (Book Chapter).

3. Zinc ameriorates barrier intestinal barrier dysfunctions by reinstating claudin 2 and 4 on the membranes in Shigellosis. **Paramita Sarkar**, Tultul Saha, Irshad Ali Sheikh, Subhra Chakraborty, Joydeep Aoun, Manoj Kumar Chakrabarti, Vazhaikkurachi M. Rajendran, Shanta Dutta, Kazi Mirajul Hoque. **American Journal Of Physiology – Gastrointestinal and liver physiology 2019 Feb 1;** 316 (2): G229- G246. **(IF 3.61).**

4. Cucumis Sativus extract elicits chloride secretion by stimulation of the intestinal TMEM16A ion channel. Tultul Saha, Joydeep Aoun, **Paramita Sarkar**, Andrea J. Bourdelais, Daniel G. Baden, Normand Leblanc, John M. Hamlyn, Owen M Woodward, Kazi Mirajul Hoque. **Pharmaceutical Biology 2021**; 59(1): 1008–1015. **(IF 2.97)**

5. Intestinal TMEM16A control luminal chloride secretion in a NHERF1 dependent manner. Tultul Saha, Joydeep Aoun, Mikio Hayashi, Irshad Ali Sheikh, **Paramita Sarkar**, Prasanta Kumar Bag, Normand Leblanc, Nadia Ameen, Owen M Woodward, Kazi Mirajul Hoque. **Biochemistry and Biophysics Reports 2021**; 25 (100912). **(CS 3.6)**

6. The gold nanopartical reduces *Vibrio Cholerae* pathogenesis by inhibition of biofilm formation and disruption of the production and structure of the cholera toxin. Tanaya

Chatterjee, Tultul Saha, **Paramita Sarkar**, Kazi Mirajul Hoque, Barun K Chatterjee, Pinak Chakraborti. **Colloids and Surfaces B: Biointerfaces 204 (2021) 111811. (IF-3.99).**

7. Drug Delivery Through Blood- Brain Barrier: Overcoming The Challenges of Barrier Tightness. **Paramita Sarkar**, M.K. Chakraborti. Everyman's Science 2017(5) 292-293. **(Editorial).**

8. Anoctamin 6 Contributes to $Cl^-$ Secretion in Accessory Cholera Enterotoxin (Ace) Stimulated Diarrhea: An Essential Role for PIP2 signalling in Cholera. ¶Joydeep Aoun, ¶Mikio Hayashi, ¶ Irshad Ali Sheikh, **Paramita Sarkar**, Tultul Saha, Rajsekhar Bhowmick, Tanaya Chatterjee, PinakChakrabarti,Manoj K Chakrabarti and Kazi Mirajul Hoque. **J Biol Chem 2016** 291(52) 26816 - 26836**. (IF- 4.57)**¶ Authors share equal contributions.

9. Effects of Small Molecule Calcium-Activated Chloride Channel Inhibitors on Structure and Function of Accessory Cholera Enterotoxin (Ace) of Vibrio cholerae. ChatterjeeT, Sheikh IA, Chakravarty D, Chakrabarti P, **Sarkar P**, Saha T, Chakrabarti K, Hoque KM. **PLOS One 10 (11): 2015. (IF-3.05).**

**Supplements:**

1. **Paramita Sarkar,** Zengyou Ye, Woo young Chung, Shmuel Muallem**.**Ca2+ and cAMP signaling cross-talks at the E-Syt3 membrane contact sites regulates CFTR and NBCe1-B activity and epithelial HCO3- secretion. **Molecular Biology of the Cell Vol. 36, No. 1.**
2. **Paramita Sarkar**, Benjamin Lusher, Zengyou Ye, Malini Ahuja, Shmuel Muallem. Lipid directive epithelial secretion by ER-PM tethers. **Biophysical journal**. 121 (3): 387a
3. **Paramita Sarkar,** Tultul Saha, Mirajul Hoque Kazi. **Zinc Deficiency induces epithelial barrier dysfunction and altered intestinal ion transport in novel murine model of *Shigella flexneri* diarrhea**. **Int J Infect dis 2020.** 101S (1): 136.

4. Mirazul Hoque Kazi, Tultul Saha, Joydeep Aoun, Mikio Hayashi, Irshad Ali Sheikh, Normand Leblanc, **Paramita Sarkar**, Nadia Ameen, Owen M Woodward. **Intestinal TMEM16A function as luminal chloride channel**. **The FASEB Journal. 2020.**vol. 34 Issue s1.06115.

5. **Paramita Sarkar,** Tultul Saha, Joydeep Aoun, Subhra Chakraborty, Manoj Kumar Chakraborti, Shanta Dutta and Mirajul Kazi. **Evidence that Zinc Deficiency Impairs Gut Epithelial Barrier and intestinal Immunity**. **The FASEB Journal. 2018.**vol. 32 no. 1 Supplement 747.16.

6. Mirajul H. Kazi, Joydeep Aoun, **Paramita Sarkar,** Tultul Saha, Hemanta Koley, Vazhaikkurachi M. Rajendran , Shanta Dutta**. Efficacy and safety of TRAM-34 over Zinc in secretory diarrhea of endotoxin stimulation. Gastroenterology. 2018.** 154(6): S-53.

7. A. Sheikh,J. Aoun, **P. Sarkar**, T. Saha , M.H. Kazi. **Recombinant accessory cholera enterotoxin of Vibrio cholerae activate ANO6 via RhoA-ROCK-PIP2 signaling to induce secretary diarrhea. Int J Infect dis 2016.** 45S (1):44.

8. **P. Sarkar**, A. Sheikh, T. Saha , J. Aoun, M.H. Kazi. **Zinc restores altered intestinal ion-transport, barrier functions and counteract inflammatory mediators induced by *Shigella* infection in T84 cells. Int J Infect dis 2016.** 45S (1): 48.

9. Irshad Ali Sheikh, **Paramita Sarkar,** Tultul Saha, Joydeep Aoun, Mirajul Kazi. **Epac 1 control intestinal barrier function by regulating JAM-A trafficking via Rap2C-TNIK pathway. J gastrol and hept 2014.** 29(Suppl.3) 1-332.

10. Mirajul Kazi, **Sarkar Paramita,** Irshad Sheikh and Subhra Chakraborty. **Zinc recovers altered intestinial ion-transport and barrier function caused by *Shigella* infection in T84 cells. The FASEB Journal. 2014.**vol. 28 no. 1 Supplement 902.

## EDUCATION

| DEGREE | FIELD OF STUDY | INSTITUTION AND LOCATION | END DATE MM/YYYY |
|---|---|---|---|
| **PH.D.** | **Physiology** | The University of Calcutta, India | February 2020 |
| M.SC | **Physiology (Gold Medalist)** | The University of Burdwan, India. | August 2011 |
| B.SC | **Physiology (Hons)** | The University of Burdwan, India. | June 2009 |

## AWARDS AND MEMBERSHIPS:

- **2017:** Awarded for successful competition of "Gut Check: Exploring your Microbiome" an online course authorized by University of Colorado Boulder, University of Colorado System and University of California , San Diego offered through Coursera.
- **2016:** Award for young investigator from India and Southeast Asia from Bill and Melinda Gates foundation for oral presentation at 17$^{th}$ International Congress on Infectious Diseases, Hyderabad, India.
- **2016:** Life Member of International Society for Infectious diseases.
- **2014**: Life Member of Indian Science Congress Association.
- **2013:** Awarded DST- INSPIRE Fellowship from the Department of Science and Technology, Govt. of India.
- **2012:** Gold Medal in Physiology-2011 from The University of Burdwan.

## CONFERENCE & WORKSHOP:

- Oral Presentation at 78 th **Society of General Physiology** (SGP) meeting, Woods whole , Massachusetts, USA.
- Poster presentation at **Cell Bio24** as ASCB EMBO Meeting, San Diego, California, USA.
- Poster presentation at **Gordon Research Conferences**- **2023** Salivary Gland and Exocrine Biology, Ventura, California, USA.
- Poster presentation at**"66$^{th}$ Biophysical Society Annual Meeting"** in **2022** organized by Biophysiological Society, San Francisco, California, USA.

- **Ion Channel & transporters in immunity, inflammation & antitumor immunity** in **2021**organized by Society of General Physiologist (SGP).
- **ECFS Basic Science Webinars** in **2021** organized by European Cystic Fibrosis Society.

- **Shedding light on the dark 'ion channelome'** in **2020** by the Biophysical Society (BPS).
- Ion Channel & transporters in immunity, inflammation & antitumor immunity in 2020 organized by Society of General Physiologist (SGP).
- Poster presentation at**"106$^{th}$Indian Science Congress"** in **2019** organized by Lovely Professional University,Punjab, Indi
- Oral presentation at**"GASTRO 2018"** organized by WGO- GAT International Conference in Bangkok, Thailand.
- Poster presentation at**"3$^{rd}$International Conference on Perspectives of Cell Signaling and Molcular Medicine"**in 2017, organized by Bose Institute Kolkata, India.
- Oral presentation at**"17$^{th}$International Conference on Infectious Diseases"** in 2016 organized by ISID in Hyderabad, India.
- Oral presentation at**"103$^{th}$Indian Science Congress"**in 2016 organized by Mysore University, Mysore, India.