

Shampa Sarkar (nee Biswas), Ph.D.

Associate Professor of Physiology

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Ph.D. with over twenty four years of research experience in the field of Reproductive Biology and Endocrinology, and teaching experience of more than seventeen years to both UG and PG students of Jhargram Raj College and Presidency University.

And also teaching as a Guest faculty to PG students of Human Physiology, Kalyani University.

Professional Experience:

September 2001 – 2009

Senior Technician, in the Department of Reproductive Biology Research, CSIR- Indian Institute of Chemical Biology.

January 2009- January 2013

Assistant Professor, Department of Physiology, Jhargram Raj College, Jhargram. Where I was engaged in teaching Human Physiology to both the Honours and pass students of this subject.

At the same time I was a Guest Faculty in the Post Graduate Department of Zoology, Jhargram Raj College, where I taught Animal Physiology, Cell biology, Biophysics and Bioinstrumentation, Biotechnology (theory) and Histology and Histochemistry (Practical) to PG students of this Department.

January 2013- Till date

Assistant Professor of Physiology in the Department of Life Sciences, Presidency University. Where I am engaged in teaching Human Physiology, Cell biology and developmental biology to the major, Gen Ed and PG students of this subject.

Research Experience:

Current ongoing research projects:

- ❖ Spermicidal effect of different natural products, and dissecting their mechanism of action by using
- ❖ Development of animal model for premature ovarian failure (POF) and Polyendocrine Metabolic Ovarian Syndrome (PMOS), for studies relating to physiological and pathophysiological aspects of female reproduction.
- ❖ Isolation and characterization of stem cells from early fetal ovaries of rat. Transplantation of these stem cells in reproductively ageing female rats or POF

- rats and consequent evaluation of bone loss, restoration of endocrine and reproductive functions.
- ❖ Genome wide association studies (GWAS) of Indian Endometriotic Patients.

Externally funded research projects:

Details of Research Projects:

Number of research projects undertaken in the last five years: 3

Projects as Co-PI

Project title: “Active targeting of nanoparticles grafted with ligands to cells of reticuloendothelial system by receptor mediated endocytosis and their application against macrophage associated diseases”. Funded by DBT,
Project cost – Rs. 51.72 Lakhs, for the period of three years.
Sanction date 17th Nov, 2008.

This project was a collaborative project. The collaborators were Dr. Sanchaita Lala (Asst. Prof, Sarsuna College), Dr. Nirup Bikash Mondal (IICB), Dr. Smritinath Chakraborty (IICB), and **Dr. Shampa Sarkar (Biswas) [Jhargram Raj College]. Role-Co-PI Completed.**

Project title: “Evaluation of Chenopodium album seed extract as potential spermicidal agent in different mammalian species and chemical investigations for the lead molecule”. Funded by ICMR. Project cost Rs 27.16 Lakhs.
Sanction date 19th September 2011. For three years
This project was in collaboration with Dr. Nirup B. Mondal, Dr. Sukdev Banerjee, (Scientists, IICB) and **Dr. Shampa Sarkar (Biswas) [Jhargram Raj College]. Role Co-PI Completed.**

Projects as aPI

Project 1

Title of Project : Angiotensin II blockers in the amelioration of male germ cell degradation and the molecular mechanism behind it”

Name of Institute: Presidency University, Kolkata

Duration (From-To) : 10.04.2018 to 09.04.2021, Project cost 19,99,566.00. PI- Shampa Sarkar Biswas.

Source of funding: West Bengal Department of Biotechnology.(WBDBT)

Describe significance scientific contribution (100 words):

Cryptorchidism causes infertility by failed transformation of gonocytes into dark spermatogonia, the putative stem cells for spermatogenesis. We aim to investigate whether rodent testis matrix metalloproteinase (MMP) production loosens extracellular matrix between sertolli cells to facilitate gonocyte movement and whether this impairment caused by induced cryptorchidism can be ameliorated by Angiotensin II blockers which is known to modulate ECM degradation and facilitate ECM remodelling. The knowledge about germ cell development under these pathophysiological conditions may aid efforts to improve fertility in cryptorchidism and testicular fibrosis.

Project 2:

Title of Project : A plausible journey from kitchen via chemistry to clinic of novel Curcuminoids as microbicidal spermicides”

Duration (From-To) : 18th Nov 2018 to 17th Nov 2021

Source of funding: ICMR

Describe significance scientific contribution (100 words):

Isolation of curcuminoid -I from *Curcuma longa* rhizome and synthesis of novel derivatives of curcuminoid-I via 1-3 dipolar cycloaddition. Investigation of spermicidal efficacy of the derivatives in different mammalian species viz. rat, mice, hamster, and human along with antimicrobial efficacy studies (*in vitro*). Exploration of *in vivo* contraceptive potential of the promising compounds in rabbit and rat models to accomplish the safety and effectiveness of the products. Detailed investigation of the compounds on the microbes related with vaginal infections and sexually transmitted diseases viz. *Neisseria gonorrhoeae*, *Candida albicans*, *Trichomonas vaginalis*, *E. coli* etc. Studies on mechanism of action, local toxicity, histopathology, and teratogenicity.

Project 3

Title of Project : “Uterine Extra cellular matrix remodelling and effect of drugs in induced endometriosis in rat”.

Name of Institute: Presidency University, Kolkata

Duration (From-To) : 21/06/2019 to 20/06/2022

Source of funding: West Bengal Department of Science and Technology (WBDS&T)

Significance scientific contribution (100 words):

Endometriosis is a chronic condition characterized by the growth of hormone-responsive endometrial tissue outside the uterine cavity. It can occur in the ovaries, surface of the uterus, on the intestine, or in other tissues. The disorder originates from retrograde menstruation of endometrial tissue sloughed through fallopian tubes into the peritoneal cavity. For ectopic implantation and growth to occur, degradation of extracellular matrix (ECM) is the primary step which is done by the action of plasminogen, cathepsin D and matrix metalloproteinases (MMP)s. Matrix metalloproteinases (MMPs) are a family of calcium-dependent, Zn-containing endopeptidases that are structurally and functionally related. These latent MMPs require an activation step before they are able to cleave ECM. ECM molecules includes collagen, structural glycoprotein, fibronectin, laminin fibrinogen and proteoglycans that constitutes a well organized structure surrounding cells. Tissue remodeling involving ECM is mostly regulated by a combined action of MMPs and tissue inhibitors of metalloproteinases (TIMPs).

Hypothesis: We hypothesize that endometriosis is a process where the ECM is altered very often by the modulation of MMP and TIMP's leading to its drastic pathological changes, and these alterations can be controlled by administration of ACE inhibitors, NO modulators or estrogen analogues. And all these external modulators control the molecular machinery of endometriosis.

Projects submitted to funding agencies:

1. **Delineating the Gut microbiome-Extracellular vesicles-Mitochondrial-Epigenetic (GEME) Axis in Polyendocrine Metabolic Ovarian Syndrome (PMOS): A Multicentric Observational Study in Eastern India.** Submitted to ANRF as a Co-PI for funding.

Polyendocrine Metabolic Ovarian Syndrome (PMOS) is a multifactorial endocrine-metabolic disorder characterized by hyperandrogenism, ovulatory dysfunction, insulin resistance, obesity, chronic inflammation, and increased risks of infertility, type 2 diabetes, and cardiovascular diseases. Existing diagnostic and therapeutic approaches are largely symptom-based and fail to address the underlying biological mechanisms. Emerging evidence suggests that gut microbiome dysbiosis, extracellular vesicle (EV) signaling, mitochondrial dysfunction, and epigenetic alterations contribute significantly to PMOS pathogenesis.

The objective is to investigate the integrated Gut microbiome–Extracellular Vesicle–Mitochondrial–Epigenetic (GEME) network underlying PMOS and identify clinically translatable, minimally invasive biomarkers for early diagnosis, risk stratification, and precision intervention.

The study is expected to identify novel biomarker signatures, elucidate PMOS mechanisms, construct an integrated GEME framework, and develop predictive models for disease classification and prognosis. The findings may enable earlier diagnosis, improved risk prediction, personalized therapeutic strategies, and enhanced reproductive healthcare for Indian women.

2. **A cross-sectional analytical study to link the association between high dietary salt intake, hypertension, metabolic disorders and pre-eclampsia among rural women of Bengal.** Submitted to ANRF as PI for funding.

Hypertension and metabolic disorders are increasing rapidly in rural India due to changing dietary patterns, sedentary lifestyles, and increased consumption of processed and high-salt foods. Excess dietary sodium intake is a recognized risk factor for hypertension and cardiovascular diseases; however, evidence regarding its association with metabolic disorders and pregnancy-related complications such as preeclampsia in rural Indian populations remains limited. Existing Indian studies primarily focus on urban populations or hospital-based samples and rarely integrate sodium intake assessment with maternal health and metabolic disease outcomes. Furthermore, rural communities are undergoing nutritional transitions characterized by increased consumption of preserved foods, packaged snacks, and sodium-rich traditional diets, yet there is insufficient epidemiological data assessing the combined burden of hypertension, metabolic syndrome, and preeclampsia in these populations. The lack of comprehensive rural data limits the development of targeted public health interventions and nutrition policies aimed at reducing sodium-related disease burden among vulnerable populations, especially women of reproductive age. Therefore, this study seeks to examine the relationship between high salt intake, hypertension, metabolic disorders, and preeclampsia among rural Indian populations to address existing research and policy gaps.

We hypothesize that Socio-demographic factors significantly influence sodium consumption patterns in rural populations which induces metabolic disorders, and an increased serum sodium levels significantly increases the risk of preeclampsia among pregnant women, which is of great concern.

3. **Epigenetic Reprogramming Potential of Resveratrol in Polycystic Ovarian Syndrome: An In-Vitro Mechanistic Study.** Submitted to ANRF for NPDF position. Where I am the host.

Polycystic Ovarian Syndrome (PCOS) is a heterogeneous endocrine and metabolic disorder affecting women of reproductive age, characterized by hyperandrogenism, insulin resistance, chronic inflammation, and ovulatory dysfunction. Despite its high prevalence, existing therapeutic strategies remain largely symptomatic and fail to address the molecular mechanisms underlying disease persistence and intergenerational transmission. Emerging evidence highlights epigenetic dysregulation—including aberrant DNA methylation, altered histone modifications, and disrupted activity of epigenetic regulators—as a central driver of PCOS pathophysiology. Resveratrol, a naturally occurring polyphenolic stilbene, has gained considerable attention due to its potent antioxidant, anti-inflammatory, insulin-sensitizing, and epigenetic regulatory properties. Notably, resveratrol is a well-established activator of SIRT1, a key NAD⁺-dependent deacetylase implicated in steroidogenesis, mitochondrial function, oxidative stress regulation, and metabolic homeostasis in ovarian granulosa cells. Increasing experimental evidence suggests that resveratrol can modulate DNA methylation, histone acetylation, and microRNA expression, thereby influencing both reproductive and metabolic pathways relevant to PCOS. However, comprehensive mechanistic studies dissecting resveratrol-mediated epigenetic reprogramming in ovarian cells remain limited. The present proposal aims to investigate the epigenetic and functional effects of resveratrol in an in-vitro PCOS model using human and murine granulosa cells exposed to hyperandrogenic and hyperinsulinemic conditions. The study will evaluate resveratrol-induced changes in DNA methylation patterns, histone modifications, expression of epigenetic regulators—particularly SIRT1—and associated functional outcomes such as steroid hormone synthesis, insulin signaling efficiency, oxidative stress response, and inflammatory cytokine production. By employing cost-effective, high-throughput molecular and epigenetic approaches, this work seeks to generate robust mechanistic insights into resveratrol-based epigenetic intervention for PCOS and establish a strong preclinical foundation for future translational studies

Other Research Goals:

The specific areas of my research interest are

- i) **Cell signaling cascades** and molecular pathways involved in apoptotic changes in different physiological processes
- ii) **Embryonic stem cells** as a therapeutic tool for reproductive diseases/anomalies.
- iii) **Nanomedicine**- Using nanotechnology as the new age drug delivery system.

As for, my research goal is to better understand the fundamental mechanisms of human reproductive system and related diseases and more importantly, to translate basic research findings into therapeutic applications.

I would like to dedicate my extra time in the lab in learning and executing different protocols to advance the project. I love constructive criticism and a friendly atmosphere in the lab. What I believe is that I am in quest for discovering but not for creating biology.

Full Length Papers in peer reviewed journals:

- 1. **S. Biswas**, S. N. Kabir and Alok. K. Pal "The role of Nitric Oxide in the process of implantation in rats" *Journal of reproduction and fertility*.114; 157-161,1998.
- 2. Alok. K. Pal, **Shampa Biswas**, S.K. Goswami and Syed. N. Kabir " Effect of

- Pelvic Endometrial implants on overall reproductive functions of female rats" *Biology of Reproduction*.60;954-958,1999.
3. M. Mukherjee, M. Dutta, **S. Biswas**, Alok. K. Pal, Dipankar Malakar, A.K. Bhattacharya, S. Bhattacharya and H. Kobayashi "Immotilin – A novel Sperm immobilizing protein" *Fertility Sterility*. Volume 79, supplement 3, June 2003.
 4. Srabonti Kumar, **Shampa Biswas**, Debayan Mandal, Smritinath Chakraborty, Syed N. Kabir, Sukdeb Banerjee, Nirup Bikash Mandal *Chenopodium album* seed extract: A potent sperm immobilizing agent in vitro and in-vivo. *Contraception*, Volume 75, Issue 1, January 2007, Pages 71-78.
 5. Srabonti Kumar, **Shampa Biswas**, Sukdeb Banerjee, Nirup Bikash Mandal. Evaluation of safety margins of *Chenopodium album* seed decoction: 14 day subacute toxicity and microbicidal activity. *Reproductive Biology and endocrinology*, volume 9:102; 2011.
 6. "Pentamidine isethionate loaded mannosylated poly-lactide-co-glycolide nanoparticles for effective management of visceral leishmaniasis." Arindam Maity **Shampa Biswas**, Smritinath Chakraborty. Nirup B. Mondal, Sanchaita Lala Conference paper, OMICS 2011, Hyderabad 2011
 7. Construction and application of mannose-grafted poly-DL-lactide-co-glycolide nanoparticles for active targeting of macrophages. Arindam Maity • **Shampa Biswas**, Smritinath Chakraborty, Nirup B. Mondal, Sanchaita Lala Conference paper, Mar 2011, IIT Guwahati 2011
 8. Characterize heavy metal tolerant rhizospheric sewage bacteria isolated from Tolly nullah (with special emphasis on strain *Microbacterium radiodurans* K12016) Chitrita Chatterjee, Rabindranath Bhattacharyya, **Shampa Sarkar (Biswas)** *International Journal of Engineering, Science and Mathematics* Vol. 7 Special Issue 4(1), April 2018, ISSN: 2320-0294

9. Chatterjee chitrita, Upadhyay Sayantani, Bhattacharyya Rabindranath, **Sarkar (Biswas) Shampa**. Screening Heavy metal resistance and PGPR like traits of soil bacteria, isolated from Tolly Nullah, Kolkata, India. Journal of basic Microbiology.
10. Dalal S, Adhikary J, Roy A, **Biswas SS**, Mukhopadhyay PK, Acharya S, Ghosh A. Impact of hyperglycemia on the expression of GLUT1 during oral carcinogenesis in rats. Mol Biol Rep. 2022;49(9):8369-8380. <https://doi.org/10.1007/s11033-022-07653-1>
11. Madhuchhanda Adhikari, Chayan Biswas, Piyali Mazumdar, **Shampa Sarkar (Biswas)**, Kousik Pramanick. Evaluating the potential of daily intake of polystyrene microplastics via drinking water in inducing PCOS and its ovarian fibrosis progression using female zebrafish. Nanoimpact April 2024;34 [10.1016/j.nano.2024.100507](https://doi.org/10.1016/j.nano.2024.100507)
12. Piyali Mazumdar, **Shampa Sarkar Biswas**. Melatonin: Adjunct therapeutics in ovarian endometrioma. IJPAS 2023; volume 3
13. Ishita Saha, Oly Banerjee, **Shampa Sarkar (Biswas)**, Sandip Mukherjee, COVID-19 beyond the lungs: unraveling its vascular impact and cardiovascular complications – mechanisms and therapeutic implications Science Progress2025 Vol 108(1) 1-17 DOI 10.1177/00368504251322069 Journal Science Progress
14. Piyali Mazumdar, **Shampa Sarkar Biswas**. Ramipril ameliorates endometriosis by inducing oxidative stress mediated apoptosis in the wistar rat, Journal of Molecular Histology, March 2025. (2025) 56:117 <https://doi.org/10.1007/s10735-025-10397-4>.
15. Piyali Mazumdar, **Shampa Sarkar Biswas**. "Repurposing Ramipril to mitigate EMT like transition in endometriosis by PI3K/AKT/S6K1 signalling pathway: A study in endometriosis induced rats" January 2026 Naunyn-Schmiedeberg's Archives of Pharmacology DOI: 10.1007/s00210-026-05030-4
16. Ishita Saha , Rabindra Nath Dasb , Oly Banerjee , **Shampa Sarkar (Biswas)** , Sandip Mukherjee. Joint generalized linear model analysis of hepatopancreatic markers: determinants of coronavirus disease 2019 severity and strategies for postrecovery care. Alexandria Journal of Medicine 2026, 61:1–9 DOI: 10.4103/AJOM.AJOM_76_25
17. Ishita Saha , Anirban Sinha , Anup Kumar Sadhu, Rabindra Nath Das , Satadru Ghosh , Priyajit Banerjee , Oly Banerjee , **Shampa Sarkar Biswas** , Sandip Mukherjee8 and Palash Kumar Pal. Renal function dynamics in COVID-19: exploring biomarker interactions with D-dimer and C-reactive proteins. Bioscience Reports (2026) 46 BSR20254002 <https://doi.org/10.1042/BSR20254002>
18. Namita Naskar, **Shampa Sarkar Biswas**. “Nitric Oxide: an important regulator of extra cellular matrix modulation in ovarian follicle development” Accepted in Indian Journal of Physiology and Allied Sciences(IJPAS), June2026

Invited Lectures:

SI No.	Title of the invited lecture/paper presented	Title of Conference/ Seminar with date	Organized by	Whether International /National/State or University level
1.	COVID-19 and other emerging diseases combating through lifestyle changes	NSS cell Presidency University, Kolkata January1, 2022	Department of lifeSciences, Presidency University West Bengal, India	Institutional
2.	ACE- Inhibitor treatment repairs testicular cell damage and helps to regain fertility in Cryptorchid male rats.	108 th Indian science congress Jan3-7,2023	RTM Nagpur University, Nagpur	National
3.	Polycystic ovarian syndrome from pathophysiology to novel therapeutic approaches – a proper education to patients	National Conference on Womens health in India: Issues and concern Date: 14-16 th March, 2022	Department of Physiology, Berhampore Girls College, Berhampore, Murshidabad West Bengal,,	National
4.	Clinical manifestation and a shift towards unscathed therapeutics in endometriosis.	National Conference on Sustainable health science for future generations. Date: 28-29 April 2022	Department of Physiology Kalyani University	National
5.	ACE- Inhibitor treatment repairs testicular cell damage and helps to regain fertility in Cryptorchid male rats.	Online International Conference Biomolecules to Biome Date: 24-25 th August, 2022	Department of Life Sciences, Presidency University, Kolkata	International
6.	Clinical manifestation and a shift towards unscathed therapeutics in endometriosis.	BrainHealthcon 2023 Date: 8-10 th December 2023	Brainware University, Barasat, Kolkata	International

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| 7. | ACE-1 Inhibitor treatment repairs testicular cell damage and helps to regain fertility in Cryptorchid male rats. | National seminar on Recent Advances in Animal Science RAASVB-2024 | Visva-Bharati, Shantiniketan | National |
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9. “A gentle art of saying NO: how NO regulates female gonad development and maturation”. Delivered the V.K. Vijayan Symposium lecture at the ‘Joint international conference-2026 International Academy of cardiovascular sciences and society for Nitric oxide and allied radicals’ Held at Department of Physiology, Hamdard Institute of Medical Sciences and Research New Delhi, February 5-7, 2026.

International Patents:

An international patent has been filed on “A protein from the coelomic fluid of an Indian earth worm that causes immotility of Sperm”. Patent no. 241/NF/2001 dated 30.03.2001.

Membership of Societies:

Life Member of Indian Society for studies in Research in Reproduction (ISSRF)
 Life Member of Indian Association for biomedical Scientists (IABMS)
 Life Member of Physiological Society of India (PSI)

1. Participated in “The STEM Teacher Training Workshop on Research-Based Pedagogical Tools (Level1) held from 26th February to 1st March, 2017 at IISER, Pune. Jointly sponsored by DBT, Govt of India; Newton Bhaba fund of the British Council. It was conducted by a team of experts from the Centre for Science Education, Sheffield Hallam University, UK
2. Was nominated as a Resource Person to deliver a series of lectures at the AICTE Sponsored Quality Improvement Program organized by Department of Pharmaceutical Sciences and Technology, Birla Institute of Technology. Mesra, Ranchi from June 16-22, 2017.
3. Was nominated as a Resource person to Deliver a Valedictory lecture to Summer Science Camp entitled INSPIRE INTERNSHIP – 2018 (Innovation in Science Pursuit for Inspired Research) attending 10+2 Science studying students. Held at Burdwan University, from October 03 to 07, 2018.
4. I am a Convenor of PSI Education Committee since July 2023. We have successfully aired 35 online lectures conducted every month on topics covered in Physiology curriculum for MBBS, BDS, UG nursing, UG/PG degree course students. Which are available online in YouTube.