



DR. RUMA SARKAR

Assistant professor, Microbiology, Department of Allied Health Sciences, ICFAI University Tripura
Highly organized, innovative, diligent and strong teaching and research professional.

PROFESSIONAL EXPERIENCE

2016-2018 : Assistant Professor, Microbiology, Sarada Ma Girls' College

2018-2019: Faculty for paramedical (DMLT) science, George Telegraph Training Institute. (part time)

2018- 2020: National Postdoctoral Fellow, DST-SERB, IACS, Kolkata.

2019- 2020: Visiting professor , Microbiology Vijaygarh Jyotish Ray College

2020 to 30-11-2021: Assistant professor, Department of Allied Health Sciences, ICFAI University Tripura

23-5-2022 to till date: Assistant professor, Faculty of Medical Science, Charotar University of Science and Technology (CHARUSAT)

ACADEMIC CREDENTIALS

Ph.D Biotechnology	Chittaranjan National Cancer Institute	2017	-
M.Sc. Microbiology	University of Calcutta	2010	1 st class. Grade-A ⁺
B.Sc. (Hons.) Microbiology	University of Calcutta	2008	1 st class
H.S	WBCHSE	2005	1 st Division
Madhyamik	WBBSE	2003	1 st division

ACHIEVEMENTS

- Qualified NET LS (Rank 156/1065), June 2010.
- Qualified GATE 2010 (Score:-399) Percentile: 92, Rank 862
- Awarded Ph.D degree in Biotechnology on 20th November, 2017.
- Awarded DST-SERB National Postdoctoral fellowship (NPDF) on 6th October 2017.
- Awarded for best poster presentation during the conference and symposium of 30th Annual Convention of Indian Association for Cancer Research and International Symposium on "Signaling Network and Cancer", 2011, CSIR-IICB, Kolkata, India.
- Awarded first for poster presentation in research during the conference of 1st Indian Cancer Congress,,2013, Kempinski Ambience Hotel, Delhi, India.



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<https://scholar.google.com/citations?user=tXunPiQA AAAJ&hl=en>

CORE COMPETENCIES

- Teaching
- Administrative works associated with teaching
- Project writing & management
- Research Grant Application
- Research and analysis
- Microbiology
- Virology
- Biochemistry
- Cancer biology
- Biotechnology
- Paramedical Sciences
- Molecular Biology (Western blot, Q-PCR, RT PCR, Flow Cytometry, ELISA)
- in vitro* cell based assays
- Mammalian cell culture
- PowerPoint presentation
- Animal handling

LANGUAGES

English:

Full professional proficiency

Hindi

Professional working proficiency

Bengali

Native or bilingual proficiency

TEACHING SUMMERY

Designation	Institute/College	Duration	Total
Assistant Professor (Department of Microbiology)	Sarada Ma Girls' College (affiliated to West Bengal State University).	1 st July 2016 to 31 st March 2018	4 years 4 month s 8 days
Faculty paramedical science (DMLT)	George Telegraph Training Institute.	1 st April 2018 to 28 th February 2019	
Visiting professor (Department of Microbiology)	Vijaygarh Jyotish Ray College (affiliated to University of Calcutta)	14 th September 2019 to 18 th February 2020	
Assistant professor, (Department of Allied Health Sciences)	ICFAI University Tripura	27 th October 2020 to 30 th November 2021	
Assistant professor, (Department of Medical Lab Technology)	Charotar University of Science and Technology (CHARUSAT)	23-rd May 2022 to till date	

Institute/College	Course taught	Level
Sarada Ma Girls' College	Microbiology (General Microbiology, Medical Microbiology), Virology, Recombinant DNA Technology, Immunology, Biophysics, Genetics, Biochemistry.	Undergraduate
George Telegraph Training Institute	Microbiology, Immunology, Biochemistry for DMLT courses	Diploma
Vijaygarh Jyotish Ray College	Regulation of eukaryotic gene expression, Plant Biotechnology and Genetic engineering	Postgraduate
ICFAI University Tripura	General Microbiology and Bacteriology, Bacteriology and applied pathology, Physical and analytical Biochemistry, Metabolic Biochemistry, Immunology and Virology, Molecular Biology	Undergraduate, Postgraduate

SKILLS AND RESPONSIBILITIES

📌 ACADEMIC:

- Developed and implemented innovative instructional methodologies and learning environment (Problem/research based interactive teaching approaches, presentations based teaching with videos/pictures, using teaching tool; 3D model) to improve students' performance.
- Implemented practical demonstration of the theory to clear the concept and give a deep insight into the subject. Guided and mentored students during practical classes.
- Internal question paper setting, preparation of routine, reading materials and distribution of class/syllabus among other faculties,
- Graded exams and papers. Kept records of student scores and attendance.
- Evaluated and monitored students' academic progress, offered detailed feedback, appropriate suggestion and instructional assistance.
- Research project proposal writing for grant application.

📌 ADMINISTRATIVE:

- Served on academic and administrative committees as assigned.
- Contributed to the efficient management and administration of the department and the college.
- Actively participated in career counseling and in students' admission related affairs.
- Participated in departmental and college meetings.
- Supervised departmental purchase process for laboratory reagents, instruments.

📌 OTHERS:

- University appointed scrutinizer of answer scripts and examiner for practical paper.
- Worked as an invigilator for college/ university/Government service recruitment examinations.

RESEARCH SUMMERY

Doctoral Research

THESIS TITLE: Modulation of tumor markers by dietary phytochemicals sensitize cancer cells towards chemotherapeutic drugs

Heat shock proteins (HSPs) and histone deacetylases (HDACs) are important families of proteins that are overexpressed in cancers and promote tumorigenesis. Our study deciphered the pivotal role of reactive oxygen species (ROS) in the upregulation of HSPs and HDAC6 in breast cancer and leukemia cells. Furthermore, we found that phytochemicals such as phenethylisothiocyanate (PEITC)/ sulphoraphane (SFN)/ curcumin, by virtue of their antioxidant potential can effectively downregulate the expression of HSPs/HDACs. These phytochemicals were found to activate Nrf2/ARE antioxidant signaling cascade. PEITC and SFN acted as indirect antioxidants; whereas, curcumin functioned as bi-functional antioxidant. HDAC6 was found to regulate the expression of HSPs. Inhibition of HSPs/HDACs finally results in modulation of their corresponding client proteins ultimately leading to the reduction of cancer cell viability, induction of cell-cycle arrest, apoptosis and deceleration of metastasis. Prior exposure of the phytochemicals, sensitized the tumor cells to chemotherapeutic drug induced killing, thereby resulting in minimization of drug dosage and associated toxicities. Therefore, the dietary molecules used in this study have a promising role in synergistic therapy of cancer by enhancing drug efficacy.

Postdoctoral Research

• *Project 1:* Metastasis associated protein 1 (MTA1) contributes to the process of cancer progression and metastasis through multiple genes and protein targets. In this study we established that the coagulation factor thrombin has a positive regulatory role over MTA1. Thrombin was found to activate PAR1/NOX/ROS signaling cascade that resulted in the up-regulation of MTA1, ultimately leading to the promotion of metastasis in the breast cancer cells.

• *Project 2:* In this study we have explored the anticancer activity of some organically synthesized naturally occurring compounds (Sunshinamide and Pestalotioprolides) and their underlying molecular mechanisms. The synthesized compounds were found to be selective towards cancer cell lines and possessed attractive cytotoxic activity. To get more insight into the mechanism behind their cytotoxicity, it was revealed that these compounds can induce apoptosis and curb metastasis. Pestalotioprolides were further studied to unravel its molecular target. The in silico docking analysis revealed that pestalotioprolides have inhibitory action over thioredoxin reductase (TrxR), an important target in cancer therapy. This inhibition leads to the induction of apoptosis via Trx1/ASK1/p38 MAPK death signaling cascade. Targeting TrxR thus discloses the mechanism underlying the biological activity of Pestalotioprolides, and helps in understanding its action in cancer treatment.

RESEARCH EXPERIENCE

Designation	Institute	Duration	No of Years	Total
Ph.D research scholar	Chittaranjan National Cancer Institute	10 th August 2010- 30 th June 2016	5 years 10 months	8 years 4 months
DST-SERB National postdoctoral fellow	Indian Association for the Cultivation of Sciences	2 nd April 2018- 1 st October 2020	2 years 6 months	

RESEARCH TECHNIQUES AND SKILLS

- Cell culture: Maintenance of adherent and non-adherent cell lines (MCF-7, MDA-MB-231, WI 38, CHO-K1, MDA-MB-468, K-562, HL60, HeLa, HEPG2), primary and secondary cell line handling, cell freezing, 3D cell culture
- *In vitro* cell based assay (coculture assays, clonogenic assay, proliferation assays, migration./invasion/adhesion/ aggregation/ wound healing assays, comet assay, cell cycle analysis, apoptosis related assay, cell signaling study, determination of cytokine release)
- Cytotoxicity studies-MTT
- Determination of efficacy of drugs
- Target validation experiments using Si RNA
- Animal handling (mice) and *in vivo* assays
- Immuno-histochemistry
- Molecular Biology: DNA isolation, plasmid isolation, RNA isolation; real time PCR (Q-PCR), RT-PCR, western blotting, flow cytometry
- Immunological techniques: ELISA, Lymphocytes separation
- Microbiological techniques
- Biochemicals assays (enzyme activity assays, ROS measurement, antioxidant assays)
- Biophysics and Instrumentation: Agarose Gel electrophoresis, SDS-PAGE, ELISA plate reader, Flow cytometer, Gel electrophoresis chamber, Trans blot apparatus, Spectrophotometer, Spectrofluorimeter, Fluorescence microscope, Gel documentation, microscope (Inverted, Phase contrast, Confocal), PCR, Microtome, Freeze Dryer
- Software expertise: Microsoft Office (word, Excel, PowerPoint), Graph Pad Prism, Image J, Adobe photoshop
- Well versed in preparation of scientific reports, manuscripts, scientific PowerPoint presentation, written and oral communication
- Develop, design and direct research activities independently including data collection, evaluation and analyses for a research
- Able to troubleshoot experiments
- Perform administrative work in support of research objectives; develop and monitor project budget.
- Perform complex laboratory procedures with responsibility for the independent development of experimental methods and procedures.
- Perform basic mathematical and statistical analyses.
- Independently design/write research projects and apply for grants
- Team-player and also able to work independently

1. Roy M, Mukherjee S, **Sarkar R**, Biswas J. Curcumin sensitizes chemotherapeutic drugs via modulation of PKC, telomerase, NF-kappa β and HDAC in breast cancer. *Ther Deliv.* 2011;2(10):1275-93.
2. Mukherjee S, **Sarkar R**, Biswas J and Roy M. Curcumin inhibits histone deacetylase leading to cell cycle arrest and apoptosis via upregulation of p21 in breast cancer cell lines. *Int J of green nanotech.* 2012; 4(2):183-97.
3. **Sarkar R**, Mukherjee S, Biswas J, Roy M. Sulphoraphane, a naturally occurring isothiocyanate induces apoptosis in breast cancer cells by targeting heat shock proteins. *Biochem Biophys Res Commun.* 2012;427(1):80-5.
4. **Sarkar R**, Mukherjee S, Roy M. Targeting heat shock proteins by phenethyl isothiocyanate results in cell-cycle arrest and apoptosis of human breast cancer cells. *Nutr Cancer.* 2013;65(3):480-93.
5. **Sarkar R**, Mukherjee A, Biswas R, Biswas J, Roy M. Sulphoraphane, by virtue of its antioxidant potential down-regulates HSP90 in leukemia cells. *Int. J. Curr. Microbiol. App. Sci.* 2014;3(1):476-86.
6. **Sarkar R**, Mukherjee A, Mukherjee S, Biswas R, Biswas J, Roy M. Curcumin augments the efficacy of antitumor drugs used in leukemia by modulation of heat shock proteins via HDAC6. *J Environ Pathol Toxicol Oncol.* 2014;33(3):247-63.
7. **Sarkar R**, Roy R and Chaudhuri Nag A. Anti-inflammatory effect of *Kalanchoe crenata* extract in mice with experimentally induced inflammation. *Int. J. Curr. Microbiol. App. Sci.* 2015; 4 (6): 95-102.
8. Roy M, Mukherjee A, **Sarkar R**, Mukherjee S, Biswas J. In search of natural remediation for cervical cancer. *Anticancer Agents Med Chem.* 2015; 15(1):57-65.
9. Roy M, K B Ajaikumar, Mukherjee A, **Sarkar R**, Mukherjee Sutapa and Biswas Jaydip. Repair Activity Impaired by Arsenic: Recovery by Phytochemicals. *Int. J. Curr. Microbiol. App. Sci.* 2015;4(1): 578-87
10. Roy M, **Sarkar R**, Mukherjee A, Mukherjee S. Inhibition of crosstalk between Bcr-Abl and PKC signaling by PEITC, augments imatinib sensitivity in chronic myelogenous leukemia cells. *Chem Biol Interact.* 2015;242:195-201.
11. Roy M, **Sarkar R**, Mukherjee S, Mukherjee A, Biswas J. Sulforaphane Inhibits Metastatic Events in Breast Cancer Cells through Genetic and Epigenetic Regulation. *J Carcinog Mutagen.* 2015; 6:4.
12. **Sarkar R**, Mukherjee S, Biswas J, Roy M. Phenethyl isothiocyanate, by virtue of its antioxidant activity, inhibits invasiveness and metastatic potential of breast cancer cells: HIF-1 α as a putative target. *Free Radic Res.* 2016;50(1):84-100.
13. Mukherjee A, **Sarkar R**, Mukherjee S, Biswas J and Roy M. Curcumin Boosts up the Efficacy of Imatinib Mesylate in Chronic Myelogenic Leukemia Cell Line K-562 by Modulation of Various Markers. *Int.J.Curr.Microbiol.App.Sci* 2016: 5(12): 240-255.
14. Kar S, Kundu B, Reis RL, **Sarkar R**, Nandy P, Basu R, Das S. Curcumin ameliorates the targeted delivery of methotrexate intercalated montmorillonite clay to cancer cells. *Eur J Pharm Sci.* 2019;135:91-102.
15. Mondal J, **Sarkar, R**, Sen P, and Goswami RK. Total Synthesis and Stereochemical Assignment of Sunshinamide and Its Anticancer Activity. *Organic Letters.* 2020, DOI: 10.1021/acs.orglett.0c00070

16. **Sarkar R**, Paul D, Pradhan S, Bhattacharya A, Goswami K R, Sen P. Pestalotioprolide E targets thioredoxin reductase and exhibits defense against triple-negative breast cancer. (Communicated)

BOOK CHAPTERS

1. Roy M, Mukherjee A, **Sarkar R**, Mukherjee S and Biswas J. Anticancer properties of aromatic plant components. Indian perfumer. 2016: 60(3): 17-23.
2. Roy M, **Sarkar R**, Mukherjee A, Mukherjee S, Biswas J. Phytochemicals as Chemosensitizers in Breast Cancer. Cancer Cell Chemoresistance And Chemosensitization. 2018:13:129.

CONFERENCE ATTENDED

1. Changing Facets of Microbiology in 21st Century Sponsored by UGC, Organised by Department of Microbiology Lady Brabourne College, Kolkata, November 27th and 28th, 2008 (Participated).
2. UGC Sponsored State level Seminar on Playing God: Expanding Frontiers of Biotechnology organised by Gurudas college in collaboration with IICB Kolkata, November 6th and 7th, 2009 (Participated).
3. **Sarkar R**, Roy R and Nag Chaudhuri A. Antiinflammatory activity of ayurvedic plant *Kalanchoe crenata* on mice. UGC Sponsored State level Seminar on Playing God: Expanding Frontiers of Biotechnology organised by Gurudas College in collaboration with IICB Kolkata, November 6th and 7th, 2009.
4. Assessment of awareness of girl students of premier colleges in Kolkata on cancer of uterine cervix. Microbiology Dept. of Lady Brabourne College, Kolkata. Symposium on Cervical Cancer Control in India organised by Cancer Foundation of India, 4th December, 2009, Kolkata.
5. **Sarkar R**, Mukherjee S and Roy M. Natural Isothiocyanates as Modulators of Heat Shock Proteins in Breast Cancer. 30th Annual Convention of Indian Association for Cancer Research and International Symposium on "Signaling Network and Cancer", February 6-9, 2011, CSIR-IICB, Kolkata.
6. **Sarkar R**, Mukherjee S, Roy M. PEITC as modulator of heat shock proteins in breast cancer. Fourth International symposium on Translational Cancer Research: Recent Developments in Cancer Prevention, December 16-19, Udaipur, Rajasthan, India.(Oral presentation)
7. Participated in 100th Indian Science Congress, 3-7th January, 2013 University of Calcutta, Kolkata, India .
8. **Sarkar R**, Mukherjee S, Biswas J, Roy M. Sulphoraphane, a naturally occurring isothiocyanate induces apoptosis in breast cancer cells by targeting heat shock proteins. 1st Indian Cancer Congress, November 21-24, 2013, Kempinski Ambience Hotel, Delhi, India.
9. **Sarkar R**, Mukherjee S, Roy M. Natural Isothiocyanates Modulate Heat Shock Proteins in Leukemia: Mechanistic approach 1st Indian Cancer Congress, November 21-24, 2013, Kempinski Ambience Hotel, Delhi, India.
10. **Sarkar R**, Mukherjee S, Roy M. Sulphoraphane induces apoptosis in breast cancer

11. **Sarkar R**, Mukherjee S, Roy M. Curcumin induces apoptosis in leukemia cells by targeting heat shock proteins via HDAC6. National conference on nanoscience and nanotechnology, September 18-19, 2014 held at Centre for Research in Nanoscience and Nanotechnology (CRNN), University of Calcutta, Kolkata.
12. **Sarkar R**, Mukherjee S, Biswas J, Roy M. Sulphoraphane, a naturally occurring isothiocyanate induces apoptosis in breast cancer cells by targeting heat shock proteins. West Bengal state council of science & technology sponsored national seminar on “Current Innovation in Biotechnology for Human Welfare”. November 7th, 2015, GNIPST.
13. **Sarkar R**, Mukherjee S, Roy M. Phenethyl isothiocyanate, through its indirect antioxidant function retards metastasis in breast cancer cells by down-regulation of HIF-1 α . 17th All India Congress of Cytology and Genetics & International Symposium on “Exploring Genomes: The New Frontier”, December 22-24, 2015, IICB, Kolkata.
14. Participated at Indian International Science Festival 2019 held at Biswa Bangla Convention centre, Kolkata during November 5-8th, 2019.

WORKSHOP & TRAINING

Participated and trained in the “Master class on flow cytometry”, - National Workshop to Decipher Flow-based Applications. 18-24th November 2018, held at Center For Research In Nanoscience & Nanotechnology, University of Calcutta & BD Biosciences.

REFERENCES

Dr. Madhumita Roy

Senior Scientific Officer (Assistant Director grade), Chittaranjan National Cancer Institute Environmental Carcinogenesis and Toxicology, Officer in Charge (Research).

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HOBBIES AND INTERESTS

Travel enthusiast, **food blogger** (<https://rumagastronomy.blogspot.com/>), enjoy reading and writing travel stories, cooking, listening music.

Ruma Sarkar