

Environmental Epigenomics Laboratory



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"From the initial days of my Ph. D. and throughout my Postdoctoral research, I was interested to study the interaction between genes and environment. My focus is to understand how alterations in either/both factors, can lead to disease susceptibility "

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With the understanding that "DNA is not the destiny", this lab focuses primarily on Epigenetics study from a varied perspective. Epigenetics plays a prime role in diseases susceptibility and differential manifestation, gene-environment interaction, behavioural adaptations and also in therapeutic interventions. Our lab currently focuses on the following research dimensions.

Arsenic research & Trace metal Analyses: We have been engaged to monitor arsenic exposed population of Murshidabad for last 12 years and organized medical camp and promote health education and active awareness. We have identified the mechanism of arsenic-induced toxicity and carcinogenicity. Quantitative analysis of multiple heavy metals and trace elements are done from biological samples (blood, hair, urine) using ED-XRF, ICP-OES and PIXE. The epigenetic markers identified through our research will help to develop epigenetic drugs in upcoming days.

Nutri-epigenomics: Nutriepigenomics is an emerging area of research. Nutritional imbalance at critical stages of life may lead to non-communicable diseases (NCDs) such as obesity, cardiovascular disease, diabetes, hypertension, and cancer. At present, we have examined the epigenetic role of black tea bioactive and its role in colon cancer inhibition in mice model. Our aim is to identify potential dietary factor to counteract obesity in future. The challenges and opportunities of dietary treatments as epigenetic modifiers for disease prevention and therapy will give a new direction.

Non-communicable lifestyle disorders

Obesity: Comorbidities like high blood pressure, diabetes, and cardio-vascular diseases are well known risk factors and Obesity is one of the main culprits behind it. Prolonged work in sitting posture, no exercise, unhealthy food habit, less sleep etc. are known causes. Apart from these, are genetic and epigenetic factors. My team investigate the genetic as also epigenetic factors of obesity regulating genes and we provide health workshop for participants and guide them with yoga, personalized exercise and diet with clinical consultation.

Polycystic ovary syndrome (PCOS): The most common endocrine disorder in women, presenting with several possible combinations of signs and symptoms and a range of phenotypes, which may include reproductive, endocrine, and metabolic alterations. Our focus is to identify the epigenetic biomarkers for PCOS.

Sustainable mitigation strategies for environmental and occupational health hazards

We have identified a large group of rural people engaged in waste hair reprocessing, which has a huge market at high profit; however, it comes with a cost on adverse health effect, less focused before. Health awareness and education services to the community has been provided through self-help group. Especial emphasis given on women and child health. We have created a model village and demonstrated how proper workflow can reduce health problems and environmental degradation from unscientific disposal. We have been successfully integrated cultural and social values towards local environmental protection. Through extensive research work for last five years, we are able to provide them Treatment, Training and Sustainable solutions.

Behavioral Epigenetics

We are currently studying the behavioural adaptation in non-human primates living in and around urban areas. We aim to investigate whether gene-environment interplay has any direct effect on our model system's behaviour and try to bridge the gap between behaviour and genetics.

Bioinformatics analysis

Mutational analysis of sequences at nucleotide and amino acids is done and the impact of those mutations are predicted by structure-function analysis of proteins. This is an integral part of all studies undergoing in my lab .

List of Publications

Total 55 publications, with 1584 total citation and h-index 19.

Research articles:

1. Bhattacharya R, Chatterjee R, Mandal AK, Mukhopadhyay A, Basu S, Giri AK, Chatterjee U, **Bhattacharjee P***. Theaflavin-containing black tea extract: A potential DNA methyltransferase- inhibitor in human colon cancer cells and Ehrlich ascites carcinoma-induced solid tumors in mice. *Nutrition and Cancer –An International Journal*, 2020 (accepted)
2. Bhowmik AD, Podder S, Mondal P, Shaw P, Bandyopadhyay A, Das A, **Bhattacharjee P**, Chakraborty A, Sudarshan M, Chattopadhyay A. Chronic exposure to environmentally relevant concentration of fluoride alters Ogg1 and Rad51 expressions in mice: *involvement of epigenetic regulation*. *Ecotoxicology and Environmental Safety*, 2020, 110962 (**Impact Factor: 4.872**)
3. Banerjee S, Dhar S, Bhattacharjee S, **Bhattacharjee P***. Decoding the lethal effect of SARS-CoV-2 (novel coronavirus) strains from global perspective: molecular pathogenesis and evolutionary divergence DOI: 10.1101/2020.04.06.027854
4. Banerjee S, Seal S, Dey R, Mondal K, **Bhattacharjee P***. Mutational spectra of SARS-CoV-2 orflab polyprotein and Signature mutations in the United States of America. *Journal of Medical Virology*, 2020. DOI: 10.1002/jmv.26417 (**Impact Factor: 2.049**)
5. Banerjee S, Dey R, Seal S, Mondal K, **Bhattacharjee P***. Identification of best suitable repurposed drugs considering mutational spectra at RdRp (nsp12), 3CLpro (nsp 5) and PLpro (nsp 3) of SARS-CoV-2 in Indian population. DOI: 10.21203/rs.3.rs-33879/v1
6. Sanyal, T., Paul, M., Bhattacharjee, S., **Bhattacharjee, P***. Epigenetic alteration of (without skin lesions) and in skin cancer tissues: A case control study, *Chemosphere* 2020; 258.
7. Mondal KK, Banerjee S, Dhar S, Sudarshan M, Bhattacharjee P.* 2020. The impact of human waste hair reprocessing occupation on environmental degradation—A case study from rural West Bengal, India. *Environ Geochem & Health*. (**Impact Factor: 3.252**)
8. Bhattacharjee P, Sanyal T, Bhattacharjee S, **Bhattacharjee P***. 2018. Epigenetic alteration of mismatch repair genes in the population chronically exposed to arsenic in West Bengal, India. *Environ Res*. 163:289-296. (**Impact Factor: 4.67**)
9. Sanyal T, Bhattacharjee P, Bhattacharjee S, **Bhattacharjee P***. 2018. Hypomethylation of mitochondrial D-loop and ND6 with increased mitochondrial DNA copy number in the arsenic-exposed population. *Toxicology*. 408: 54–61 (**Impact Factor: 3.6**)
10. Bhattacharjee P, Paul S, Bhattacharjee S, Giri AK, **Bhattacharjee P***. H3K79 monomethylation, an epigenetic signature pattern associated with arsenic-induced skin lesions. *Mutat Res Fund MolMech Mutagen*. 807 (2018) 1–9. (**Impact Factor: 3.00**)

11. Mondal K K, Sanyal T, Das S, Bhattacharjee S, **Bhattacharjee P***. Adverse health effects associated with increased cytogenetic damage and *ERCC2* risk genotype in the occupationally exposed waste hair re-cycling workers from West Bengal, India. 2018. IJRAR, November 2018, Volume 5, Issue 4. (ISSN 2349-5138). doi:10.1729/Journal.18912
12. Banerjee S, Dhar S, Bhattacharjee P*. An Integrated Analysis to Predict Functionally Altered Genetic Variants in FTO with Potential Cancer Risk". International Journal of Scientific Research & Reviews (IJSRR), 7:4 (2018) 1206-1218. (ISSN 2279-0543).
13. Banerjee S, Bhattacharjee S, Bhattacharjee P. Genetic variants of melanocortin 1 receptor (MC1R) G and skin cancer risk prediction. International Journal of Science and Research. Sep. 6:9 (2018) 101-1107. (ISSN 2319-7064).
14. Das N, Giri A, Chakraborty S, **Bhattacharjee P***. Association of single nucleotide polymorphism with arsenic-induced skin lesions and genetic damage in exposed population of West Bengal, India. Mutation Research 2016; 809:50–56 (**Impact Factor: 2.25**)
15. Chatterjee D, **Bhattacharjee P**, Sau TJ, Das JK, Sarma N, Bandyopadhyay AK, Roy SS, Giri AK. Arsenic exposure through drinking water leads to senescence and alteration of telomere length in humans: A case-control study in West Bengal, India. Mol Carcinog. 2015;54(9):800-9 (**Impact Factor: 4.77**)
16. **Bhattacharjee P**, Paul S, Banerjee M, Patra D, Banerjee P, Ghoshal N, Bandyopadhyay A, Giri AK. Functional compensation of glutathione S-transferase M1 (GSTM1) null by another GST superfamily member, GSTM2. Sci Rep. 2013; 3:2704. (**Impact Factor: 5.078**)
17. Banerjee M*, Banerjee N*, **Bhattacharjee P***, Mondal D, Lythgoe PR, Martínez M, Pan J, Polya DA, Giri AK. High arsenic in rice is associated with elevated genotoxic effects in humans. Sci Rep. 2013;3: 2195. (***equal contribution**) (**Impact Factor: 5.078**)
18. Paul S, **Bhattacharjee P**, Mishra PK, Chatterjee D, Biswas A, Deb D, Ghosh A, Guha Mazumder DN, Giri AK. Human urothelial micronucleus assay to assess genotoxic recovery by reduction of arsenic in drinking water: a cohort study in West Bengal, India. Biometals. 2013;26(5):855-62. (**Impact Factor: 2.13**)
19. **Bhattacharjee P**, Das N, Chatterjee D, Banerjee A, Das JK, Basu S, Banerjee S, Majumder P, Goswami P, Giri AK. Association of NALP2 polymorphism with arsenic induced skin lesions and other health effects. Mutat Res. 2013 ;755(1):1-5. (**Impact Factor:2.415**)
20. Paul S, Das N, **Bhattacharjee P**, Banerjee M, Das JK, Sarma N, Sarkar A, Bandyopadhyay AK, Sau TJ, Basu S, Banerjee S, Majumder P, Giri AK. Arsenic-induced toxicity and carcinogenicity: a two-wave cross-sectional study in arsenicosis individuals in West Bengal, India. J Expo Sci Environ Epidemiol. 2013;23(2):156-62. (**Impact Factor:3.185**)
21. Biswas A, Sadhukhan T, Bose K, **Ghosh P**, Giri AK, Das SK, Ray K, Ray J. Role of glutathione S-transferase T1, M1 and P1 polymorphisms in Indian Parkinson's disease patients. Parkinsonism Relat Disord. 2012;18(5):664-5. (**Impact Factor: 4.4**)

22. Kundu M, **Ghosh P**, Mitra S, Das JK, Sau TJ, Banerjee S, States JC, Giri AK. Precancerous and non-cancer disease endpoints of chronic arsenic exposure: the level of chromosomal damage and XRCC3 T241M polymorphism. *Mutat Res.* 2011 10;706(1-2):7-12. **(Impact Factor: 2.415)**
23. Banerjee M, Banerjee N, **Ghosh P**, Das JK, Basu S, Sarkar AK, States JC, Giri AK. Evaluation of the serum catalase and myeloperoxidase activities in chronic arsenic-exposed individuals and concomitant cytogenetic damage. *Toxicol Appl Pharmacol.* 2010 15;249(1):47-54. **(Impact Factor:4.55)**
24. Biswas R, **Ghosh P**, Banerjee N, Das JK, Sau T, Banerjee A, Roy S, Ganguly S, Chatterjee M, Mukherjee A, Giri AK. Analysis of T-cell proliferation and cytokine secretion in the individuals exposed to arsenic. *Hum Exp Toxicol.* 2008;27(5):381-6. **(Impact Factor:1.7)**
25. **Ghosh P**, Basu A, Singh KK, Giri AK. Evaluation of cell types for assessment of cytogenetic damage in arsenic exposed population *Mol Cancer.* 2008 28;7:45. **(Impact Factor: 6.2)**
26. De Chaudhuri S, **Ghosh P**, Sarma N, Majumdar P, Sau TJ, Basu S, Roychoudhury S, Ray K, Giri AK. Genetic variants associated with arsenic susceptibility: study of purine nucleoside phosphorylase, arsenic (+3) methyltransferase, and glutathione S-transferase omega genes. *Environ Health Perspect.* 2008;116(4):501-5. **(Impact Factor: 8.44)**
27. **Ghosh P**, Banerjee M, De Chaudhuri S, Das JK, Sarma N, Basu A, Giri AK. Increased chromosome aberration frequencies in the Bowen's patients compared to non-cancerous skin lesions individuals exposed to arsenic. *Mutat Res.* 2007;632(1-2):104-10. **(Impact Factor: 2.415)**
28. **Ghosh P**, Banerjee M, De Chaudhuri S, Chowdhury R, Das JK, Mukherjee A, Sarkar AK, Mondal L, Baidya K, Sau TJ, Banerjee A, Basu A, Chaudhuri K, Ray K, Giri AK. Comparison of health effects between individuals with and without skin lesions in the population exposed to arsenic through drinking water in West Bengal, India. *J Expo Sci Environ Epidemiol.* 2007;17(3):215-23. **(Impact Factor: 3.185)**
29. **Ghosh P**, Basu A, Mahata J, Basu S, Sengupta M, Das JK, Mukherjee A, Sarkar AK, Mondal L, Ray K, Giri AK. Cytogenetic damage and genetic variants in the individuals susceptible to arsenic-induced cancer through drinking water. *Int J Cancer.* 2006 15;118(10):2470-8. **(Impact Factor: 6.5)**
30. Basu A, **Ghosh P**, Das JK, Banerjee A, Ray K, Giri AK. Micronuclei as biomarkers of carcinogen exposure in populations exposed to arsenic through drinking water in West Bengal, India: a comparative study in three cell types. *Cancer Epidemiol Biomarkers Prev.* 2004;13(5):820-7. **(Impact Factor: 4.125)**
31. Mahata J, **Ghosh P**, Sarkar JN, Ray K, Natarajan AT, Giri AK. Effect of sodium arsenite on peripheral lymphocytes in vitro: individual susceptibility among a population exposed to arsenic through the drinking water. *Mutagenesis.* 2004;19(3):223-9. **(Impact Factor: 2.5)**

Review articles:

1. Sanyal T, Bhattacharjee P, Paul S, **Bhattacharjee P***. Recent advances in arsenic research: significance of differential susceptibility and sustainable strategies for mitigation. *Frontiers in Public Health-Environmental Health*, 2020. DOI: 10.3389/fpubh.2020.00464 (**Impact Factor: 0.672**)
2. Bhattacharjee P, Paul S, **Bhattacharjee P***. 2020. Understanding the mechanistic insight of arsenic exposure and decoding the histone cipher. *Toxicology*. 430:152340 (**Impact Factor: 3.6**)
3. Paul S, Bhattacharjee P, Giri AK, **Bhattacharjee P***. Arsenic toxicity and epimutagenicity: the new LINEage. *Biometals*. 2017. in press. doi: 10.1007/s10534-017-0021-2. (**Impact Factor: 2.13**)
4. Bhattacharya R, Biswas A, Bhattacharjee S* and **Bhattacharjee P***. Occupational lung diseases: Causes, consequences and challenges. *Current World Environment*. 12:2 (2017). doi: 10.12944/CWE.12.2.13 (ISSN: 0973-4929)
5. Ghosh K, **Bhattacharjee P**, Ghosh S, Ghosh A. Glia to glioma: A wrathful journey. *Advances in Modern Oncology Research*.2017. Open access. doi: 10.18282/amor.v3.i3.186
6. Bhattacharjee P, Paul S, **Bhattacharjee P***. 2016. Risk of Occupational exposure to Asbestos, Silicon and Arsenic on Pulmonary Disorders: Understanding the Genetic-Epigenetic Interplay and Future Prospects. **Env Res 2016**, 147:425–434 (**Impact Factor: 4.3**).
7. **Bhattacharjee P**, Chatterjee D, Singh KK, Giri AK. Systems biology approaches to evaluate arsenic toxicity and carcinogenicity: an overview. *Int J Hyg Environ Health*. 2013, 216:574-586. (**Impact Factor: 3.331**).
8. **Bhattacharjee P**, Banerjee M, Giri AK. Role of genomic instability in arsenic-induced carcinogenicity. A review. *Environ Int*.2013, 53:29-40. (**Impact Factor: 6.122**)
9. **Ghosh P**, Banerjee M, Giri AK, Ray K. Toxicogenomics of arsenic: classical ideas and recent advances. *Mutat Res*. 2008;659(3):293-301. Review. (**Impact Factor: 5.5**)
10. Mahata J, Chaki M, **Ghosh P**, Das LK, Baidya K, Ray K, Natarajan AT, Giri AK. Chromosomal aberrations in arsenic-exposed human populations: a review with special reference to a comprehensive study in West Bengal, India. *Cytogenet Genome Res*. 2004;104(1-4):359-64. Review. (**Impact Factor: 1.5**)

Book chapters:

1. Bhattacharjee R, Dhar S, Mukhopadhyay A, **Bhattacharjee P.*** 2020. Pharmacotherapeutic Botanicals for Cancer Chemoprevention. Chapter Contributed: Dietary Phytochemicals as Epigenetic Modulators in Cancer Prevention: Emerging Research Trends, Gaps, and Future Perspectives. Springer Nature, Singapore
2. Paul S and **Bhattacharjee P***. Arsenic: Exposure sources, Health Risks, and Mechanisms of Toxicity, First Edition. Chapter Contributed: Epigenetics and Arsenic Toxicity. John Wiley & Sons, Inc. 2015. *Corresponding author
3. Sanyal T, Mondal K, Bhattacharjee P, Banerjee S, Ghosh S, Bhattacharya R, Bhattacharjee S and **Bhattacharjee P***. Chapter: Occupational and Environmental

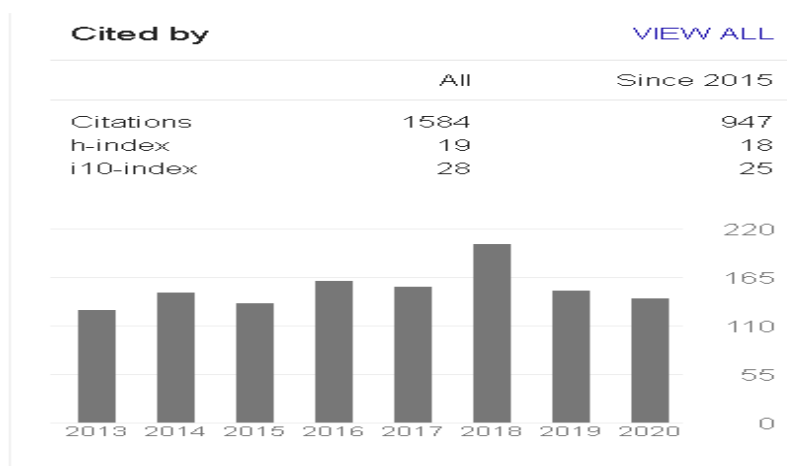
Health Hazards: Selected case studies from West Bengal, India. UGC-HRDC, 2017. ISBN: 978-93-5268-753-4. *Corresponding author.

4. **Bhattacharjee P***, Banerjee S, Ghosh S, Chakraborty S and Kar A. Heavy Metals in Relevance to Human Health: Mechanism of Toxicity and Carcinogenicity. 2017 (in press)
5. Banerjee M, **Bhattacharjee P**, Giri AK. Arsenic-induced Cancers: A review with special reference to gene, environment and their interaction. Genes and Environment. 2011.

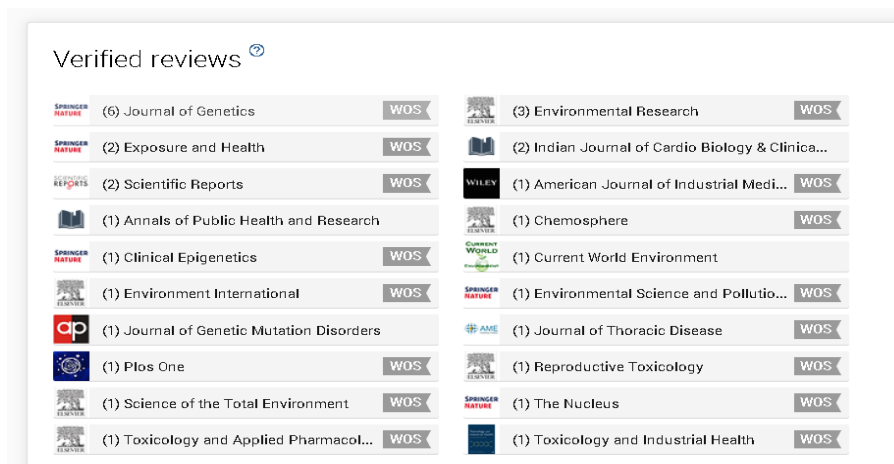
Book(s):

Published a book for Environmental Studies (based on UGC approved under graduate syllabus) named “Paribesh Vidya” from Kalyani publication.

Research Citation (Stats from Google Scholar)



Role as a Reviewer (Stats from Publons)



Mentorship



Dr. Manabi Paul

DST-Inspire Faculty

Project: Behavioural adaptation in urban-adapted primates.



Dr. Pritha Bhattacharjee

PhD Awarded

Project: Arsenic induced epigenetic alteration and carcinogenicity.



Krishnendu Ghosh

ICMR Research Fellow
(Thesis Submitted)

Project: Human glioma biology & neuro-onco immunology.



Kousik Kr. Mondal

Govt. approved part-time Lecturer (Thesis Submitted)

Project: Epidemiological & environmental consequences on occupational health.



Tamalika Sanyal

CSIR-UGC-SRF (Thesis Submitted)

Project: Altered mitochondrial epigenetics in arsenic toxicity and carcinogenesis.



Ritwija Bhattacharya

UGC-UPE-JRF

Project: Project: Role of black tea in cancer therapy and application of spent tea leaves in environmental waste management.



Shuvam Banerjee

UGC-DAE-JRF

Project: Trace metal analysis in biological samples and in-silico study.



Sunandini Ghosh

UGC-UPE-JRF

Project: Obesity and its association with cardiovascular disease risk.



Shrinjana Dhar

Research Fellow

Project: Role of endocrine disruptors in Polycystic Ovarian Syndrome (PCOS).



Ankita Das

CSIR-JRF

Project: Arsenic induced epigenetic deregulations and carcinogenesis in human.



Dishari Dasgupta

CSIR-LS (DST-INSPIRE project JRF)

Project: Cooperation-conflict dynamics in urban-adapted non-human primates.

Research Funds and Collaborators

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