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Environmental epigenetics in population exposed to chronic arsenic & Cancer

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Chronic arsenic exposure and its cancer association is already known. Our study explored the epigenetic perspectives of arsenic toxicity. The major investigations we performed include DNA damage response, telomere regulation, arsenic methylation and mitochondrial biogenesis. Our novel findings are to identify signature patterns for arsenic exposure (compared to those who are unexposed) and arsenic-induced characteristic lesion (compared to arsenic exposed No Skin Lesion group). Although arsenic induced skin lesions are hallmarks of arsenic toxicity, it is observed only among15-20% of the exposed population. This clearly indicates environment and gene crosstalk each other with significant variation at population level. We have identified alteration in DNA methylation pattern for the candidate genes, histone post translational modifications and also differential miRNA regulation. Among all different pathways, most critical is the arsenic metabolism pathway. This metabolism depends on the efficiency of arsenic methylation, which is further dependant on methylation donor SAM (S-Adenosyl L-methionine) level and enzyme activity of AS3MT (Arsenite methyltransferase). Our study identified how arsenic depletes SAM level and affect overall metabolism leading to arsenic susceptibility. Mitochondrial biogenesis also play a significant role, where regulatory genes including PGC1α, Tfam, NRF1 and NRF2 were upregulated among arsenic induced cancer patients via promoter hypomethylation. Thus, our study considers a holistic approach to understand the epigenetic interplay in the individuals having prolonged arsenic exposure history.

Biography

Pritha Bhattacharjee is teaching at the Department of Environmental Science, University. of Calcutta, as Assistant Professor for last 8 years. She has completed her PhD from CSIR-Indian Institute of Chemical Biology in 2007 and continued her postdoctoral studies in arsenic research. Her major expertise lies with Environmental epigenetics, Occupational health and Lifestyle disorders. Dr Bhattacharjee has authored/co-authored in 55 International journal publications with 1584 total citations and h-index 19. She wrote several book chapters including text book on Environmental Studies. Dr. Pritha serves as editorial board member for highly acclaimed Frontiers in Genetics and many other journals. She is guiding a number of PhD students in biological research.