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Epigenetic susceptibility of long interspersed nuclear elements-1 towards arsenic induced DNA damage: A predictive biomarker

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Arsenic exposure mainly through drinking water has increased over the years, presently affecting more than 137 million individuals worldwide. One of the prime facets of arsenic toxicity is disruption of epigenetic profile within the cell, leading to various outcomes like silencing or activating genes from their normal state of expression. In the field of toxicology, a recent emphasis lies with the probability of epigenetic alteration and it's indulgence in DNA damage. Long Interspersed Nuclear Elements (LINE-1) have been studied as a prospective candidate to understand the global genomic methylation profile. Activity and methylation profile of these transposable elements have been associated with various forms of cancers as well as genomic stability. Since arsenic exposure yields a high degree of DNA damage, in our present study we are focusing on the epigenetic risk factor associated with DNA damage and L1-methylation. A total of 100 arsenic exposed samples were recruited from the district of Murshidabad, West Bengal. Cytogenetic damage was analyzed using micronucleus (MN) assay from lymphocytes. When the cohort comparison between arsenic exposed individuals distributed among low, medium and high degree of cytogenetic damage based on the MN frequency, we observed that there was a positive association ($p<0.01$) between the lowering of methylation profile of LINE-1 with increase in MN frequency. Our data suggests a positive influence of LINE-1 methylation may be related to alteration in chromatin landscape, leading to subsequent genomic instability upon arsenic mediated oxidative DNA damage. LINE-1 methylation hence can be predictive biomarker to epimutagenic events by arsenic.

Biography

Somnath Paul has completed his PhD dissertation work in 4.5 years, working as graduate student at CSIR-Indian Institute of Chemical Biology since 2010. He is in the process of writing his thesis, to be submitted to Jadavpur University. He has done his Bachelors in Physiology, from Presidency College, Kolkata and Masters in Genetics from University of Calcutta. He has published 7 papers in peer reviewed journals. His major thrust area of research is epigenetics and has future interest in doing research on epigenetic alterations in human diseases and understands the role of epigenetic mechanisms in various patho-physiological outcomes.

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