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Towards deciphering the epigenetic oddity: A mechanistic hindsight to account the plausible epigenomic inheritance strategies across mammalian evolutionary pathway

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Abstract

The astounding evolution over time has undoubtedly enhanced the scrutinisation of the evolutionary science. Concomitantly, it has led to ingenious approaches in genetic intervention. It is riveting to know the mechanism of inheritance by dint of above the genetics viz "Epigenetics". As a discipline, epigenetics is not new instead it took 20 years for science to catch up on it. This paramount frontier provides the opportunity to revolutionize and comprehend the role of genetics and the environment in explaining the ecology, behaviour, diseases, therapeutic methodologies of concerned maladies with the aid of epigenetic landscape. Epigenetics specifies the genetic factors that change an organism's appearance or biological functions without changing the actual DNA sequence i.e., gene expression changes but the genes themselves don't. The principle mechanisms that provide the molecular basis of epigenetic regulation of genomic expressions are: DNA methylation, histone modification, micro and non-coding RNA's. It is manifested that epigenome is mitotically inherited from progenitor pluripotent stem cells to the somatic cells undergoing differentiation, meiotically through intrauterine exposure and transgenerational inheritance by the means of genomic imprinting which is in consideration with Haig's hypothesis. This escalating challenge calls for greater emphasis in understanding the mechanisms and the cure of diseases present in the same context. Epigenetic therapy coupled with nanomedicine is considered as one of the potential methodologies to decimate cancer cells in continuous and near continuous future. The approach of revolutionary techniques can lead to better prospects and could result in achieving milestone in molecular biology paradigm which summons global demand.

Keywords: Evolutionary science, intrauterine exposures, transgenerational inheritance, genomic imprinting, Haig's hypothesis, epigenetic therapy & nanomedicine.