Editorial

Effect of Epi-drugs on Epigenetic Modifications Induced by Environmental Pollutants: Implications for the Pathophysiology of Cancer and Endocrine/metabolic Diseases

It is my pleasure to be the guest editor for the special issue focused on “Effect of epi-drugs on epigenetic modifications induced by environmental pollutants: implications for the pathophysiology of cancer and endocrine/metabolic diseases”.

We are now living in the “epigenomic era” and are faced with a growing number of information about all the DNA-external factors that control gene expression of regulatory proteins. Most epimutations, including changes in DNA methylation, histone modifications, and microRNA levels, translate into either up-regulation or silencing of gene expression which, in turn, may predispose the organism to mutational events, reduced ability to repair DNA damage, increased genomic instability, altered cellular response, and reduced apoptosis.

Over the last decades, rapidly increasing evidence has connected environmental pollutants with epigenetic variations that may occur in a wide spectrum of diseases, including a variety of tumors and metabolic disorders. For these reasons, several clinical trials employing epi-drugs are underway or planned especially in areas exposed to environmental contaminants. Agents regulating histone deacetylases (HDACs), DNA methyltransferases (DNMTs), or miRNA expression profiles are proving to represent a good alternative for treating pollutant-induced diseases.

This special thematic issue takes into account: i) the epigenetic alterations induced by environmental chemical exposures and the underlying mechanisms; ii) their impact on human health; iii) the association with carcinogenesis, deregulation of cell cycle and apoptosis, altered mitochondrial function, energy metabolism, and impairment of the development process; iv) the biomarkers relevant in establishing the environmental health risk and response to treatment.

The data reported in this issue will give opportunities, challenges and future directions for epidemiology research in environmental epigenomics coupled to neoplastic, metabolic, and developmental diseases. Understanding the nature and the role of environmental pollutants on the epigenetic interactions and assessing correctly the risk of incidence of severe conditions that threaten the health and life expectancy represent a major challenge for basic and translational research. These acquisitions will further strengthen the precondition for the development of therapeutic strategies aimed at reversing the epigenetic damage induced by environmental pollutants.

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