THE ROLE OF EARLY-LIFE EVENTS INDUCED CHANGES IN THE EPIGENOME IN HEALTH DISPARITIES AMONG MINORITY POPULATIONS

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Abstract: Early-life events that cause changes in the epigenome are associated with increased disease susceptibility. Current available data indicate that early period of life is critical in determining ensuing susceptibility to chronic non-communicable diseases, such as obesity, type 2 diabetes mellitus, cardiovascular diseases, neurodegenerative diseases and even malignant neoplastic diseases. Epigenetic changes during the different stages of development enable the organism to respond to environmental cues and adjust its phenotypic development to match its environment. Certain environmental chemicals as well as altered nutrition, or in combination with altered nutrition, will lead to alterations in the epigenome expressed as a permanently altered gland, organ or system. Epigenetic changes that are established in early life can modulate gene expression during development and maturity. Epigenetic modifications change the binding of transcription activators and repressors to specific gene promoters, and/or alter the large-scale conformation and function of chromatin itself, which modulates gene expression. DNA methylation during epigenetic changes seems to be involved in long-term silencing of gene expression, whereas histone modifications have a short-term and flexible effect, but substantial crosstalk exists between these different mechanisms. These states of altered potential would be a result of changes in gene expression, due to altered imprinting, and the underlining methylation-related protein-DNA relationships associated with chromatin remodeling. The epigenome changes that results from the exposures/insult could lead to the occurrence of a disease that otherwise would not have happened or cause the increased risk for a disease that would normally be of lower prevalence. Finally, the epigenetic changes could have a variable latent period from onset in the neonatal period, to early childhood, to pubertal, to early adulthood to late adulthood depending on the toxicant, time of exposure and tissue/organ. The factors which cause health disparities among minorities such as poor nutrition and exposure to toxic substances (lead, mercury, and pesticides) can be associated with sub-standard conditions during pregnancy and the resultant epigenome changes that increase the incidence of chronic non-communicable diseases in the adult offspring.

Keywords: Health disparities, Minority populations, Epigenetic, DNA methylation, Toxic substance exposure

Acknowledgment: This research work was supported by a grant from NIH NCRR RCMI program (G12RR 03020)