

A REVIEW

Epigenetics: new relation of health and nutrition

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The development and maintenance of an organism is orchestrated by a set of chemical reactions that switch parts of the genome off and on at strategic times and locations. Epigenetics is the study of these reactions and the factors that influence them. The nutrients we extract from food enter metabolic pathways where they are manipulated, modified and molded into molecules, the body can use. One such pathway is responsible for making methyl groups - important epigenetic tags that silence genes. Familiar nutrients like folic acid, B vitamins and SAM-e (S-Adenosyl methionine) are key components of this methyl-making pathway. Diets high in these methyl-donating nutrients can rapidly alter gene expression, especially during early development when the epigenome is first being established. Nutrients can reverse or change epigenetic phenomena such as DNA methylation and histone modifications, thereby modifying the expression of critical genes associated with physiologic and pathologic processes, including embryonic development, aging, and carcinogenesis. It appears that nutrients and bioactive food components can influence epigenetic phenomena either by directly inhibiting enzymes that catalyze DNA methylation or histone modifications, or by altering the availability of substrates necessary for those enzymatic reactions. As we better understand the connections between diet and the epigenome, the opportunity arises for clinical applications. Enter the future field of nutrigenomics, where nutritionists take a look at your methylation pattern and design a personalized nutrition plan. While we're not quite to that point yet, your doctor can already tell a lot about your disease risk by looking at your family health history. In this regard, nutritional epigenetics has been viewed as an attractive tool to prevent pediatric developmental diseases and cancer as well as to delay aging-associated processes. In recent years, epigenetics has become an emerging issue in a broad range of diseases such as type 2 diabetes mellitus, obesity, inflammation and neurocognitive disorders.

Key words : Epigenetics, Nutrients, Gene expression, DNA methylation, Histone modifications, Epigenome

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