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Nutrigenetics- effect of nutrients on genetics: A review

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Statement of the Problem: The term "epigenetics" comes from the Greek word epigenesis and was coined by the biologist Conrad Waddington in the late 1940s. Over the past decade, there has been mounting interest in the associations between epigenetic modifications and human conditions and diseases such as aging, cancer, cardiovascular disease and obesity. While many of these pathologies can be heavily influenced by heritable factors, environmental factors also play a role. Indeed, the impact of environmental factors (i.e., diet, smoking, physical activity and pollutants) on disease pathology is thought to be mediated, in part, by epigenetics. Epigenetic is defined as changes in gene expression that occur without a change in DNA sequence passed on through cell division. Epigenetic mechanisms play an important role in mediating between the nutrient inputs and the ensuing phenotypic changes throughout our entire life. Nutritional epigenetics, refers to the effect of nutrients on DNA (and hence on gene expression), which programs or reprograms biological networks with multigenerational consequences. Epigenetics became important in the field of nutrition as it try to fill fundamental gaps in the knowledge of nutrient-genetic interactions in health and disease.

Methodology & Theoretical Orientation: Full text articles in English were included which were electronically searched in PubMed, Science Direct and other databases using keywords epigenetics and nutrition. This review paper summarizes the epigenetic roles of nutrients in physiologic and pathologic processes.

Findings: Important nutrients and food components that have an impact on epigenetics are folate, choline, genistein, etc. Nutrients can dramatically affect DNA methylation, histone modifications in specific genes and gene expression.

Conclusion & Significance: Epigenetic heterogeneity among individuals is now established as a functionally-important mechanism responsible for individual phenotypic differences and looks likely to be a very fruitful area for research aimed at understanding inter-individual differences in responses to diet. Current knowledge in nutritional epigenetics is limited, and further studies are needed to expand the available resources and better understand the use of nutrients or bioactive food components for maintaining our health and preventing diseases through modifiable epigenetic mechanisms.

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