

Gene-Nutrient Interaction: genes load the gun but diet, exercise and stress reduction pull the trigger!

There are 20,000 human genes defined by four DNA bases called Adenine(A), Guanosine(G), Thymidine (T), Cytosine (C). These can be thought of as four letters in the alphabet that code for the thousands of proteins in every cell in our body. However, since we have only one sequence in our cells, about 90% of the genetic material is there to control the expression of the other 10% of genes. Women have two different sequences since they have one X chromosome from their mother's DNA and one X chromosome from their father's DNA. The X chromosomes are inactivated in every other cells so that women are "chimeric" meaning that the DNA in their cells is not identical leading to a higher incidence of autoimmune diseases.

Nutrients also modify gene expression through epigenetics which are chemical reactions that activate or inactivate gene expression. The two most famous are methylation of genes and histone acetylation. Histones are proteins coating the chromosomes and when they are chemically modified they expose the DNA so the genes can be active. Methylation is carried out through the actions of folic acid, one of the B vitamins. This is why women of childbearing age are prescribed folic acid in a prenatal vitamin to prevent birth defects. Folic acid promotes normal neural development in the fetus. Later in life, diet and physical activity affect epigenetics and the risk of age-related chronic diseases. Eating colorful fruits and vegetables and soy protein as well as other plant foods modulate gene expression.