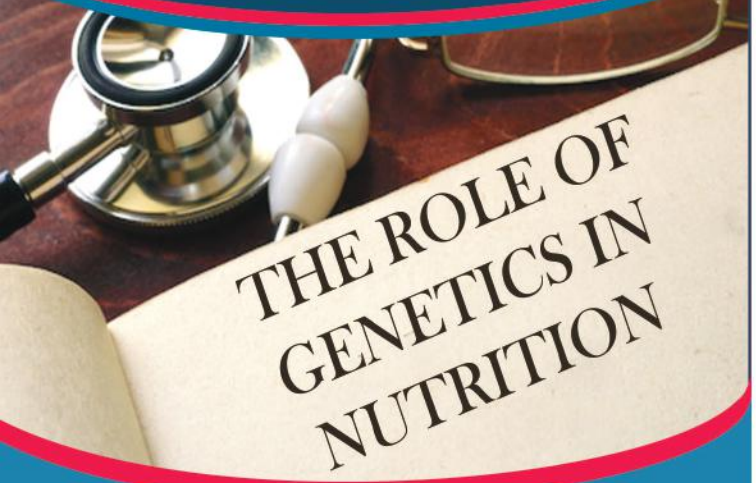
Mashhad University of Medical Sciences

ANGABIN TEB
انگبین طب

The Role of Genetics In Nutrition



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Our body is unable to produce fat-soluble vitamins. The bioavailability of vitamin E in the diet of each individual is determined by single-nucleotide polymorphisms or SNPs. Single-nucleotide polymorphism is a change in a single nucleotide in a fixed part of the DNA sequence seen in individuals of the same species.

The specific SNP associated with the bioavailability of vitamin E is controlled by a group of 28 single-nucleotide polymorphisms scattered across 11 different chromosomes. Each of these SNPs is involved in the absorption and transport of vitamins from the intestinal mucosa.

Genetic factors affecting lactose malabsorption

The cells lining the intestinal wall in humans produce an enzyme called lactase, which allows the digestion of a sugar called lactose. Lactose is a two-unit sugar or disaccharide that is made in most mammals from the simple sugars glucose and galactose, and is released into milk.

The ability to digest lactose in a number of weaned infants decreases over time; And almost disappears into adulthood. Such people have a condition called "lactose intolerance." But a number of communities, especially those of European descent, do not lose the ability to digest milk sugar. In other words, lactase activity is maintained at a desirable level by transcription of a specific gene in these individuals. Those who do not carry the gene are considered homozygous and can not digest lactose.

Obesity and genetics

The results of a number of studies on identical and heterogeneous twins suggest that genetic factors play a role in the occurrence of obesity among members of each family.

Nutrition instructions

Differences in the level of activity of enzymes lead to heterogeneity in nutritional needs. Currently, popular dietary guidelines, such as the RDA or "Recommended Dietary Allowance," are based on the metabolic consequences of eating or not eating. Although these nutritional guidelines provide a standard for determining the adequacy of specific foods, they are not tailored to the nutritional needs of different groups. Thus, even if such guidelines are modified based on the well-known nutritional differences between different communities, they may still pose a threat to the health of many smaller groups.

It should be noted again that differences between racial and ethnic groups are undeniably important in the formulation of nutritional guidelines. If we adjust our diet according to the characteristics of a particular racial group, other groups will not be able to follow such instructions.

The role of genetics in nutrition

Nutrition plays an undeniable role in public health management, but the role of genetics in nutrition is little known. Genetic differences are the cause of many of the heterogeneities we see between individuals. Heterogeneities such as; Eye color, skin and hair, weight and many other traits all borrow from genetics. Genetic differences may also be linked to dietary preferences. For example, phenylthiocarbamide (PTC) is a compound found in vegetables such as kale, broccoli, cauliflower and Brussels sprouts. For some people it's a very bitter taste, while others describe it as tasteless. The quality of taste perception of phenylthiocarbamide depends on the genetics of each individual.
A gene called TAS2R38 appears to play a role in how PTC tastes. Therefore, it is reasonable to say that such genetic differences can affect the way people eat. For example, perceiving the bitter taste of PTC reduces the desire to consume foods containing the substance, resulting in a lack of nutrients.

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In Nutrition

Genetic factors affecting the absorption of vitamins

Genetic differences in the central nervous system can affect the degree of satiety (how much a person feels full eating) and perception of tastes. Especially, Absorption of a number of vitamins may be influenced by genetic factors.

For example, hemochromatosis is an iron-related disorder in which an extra load of iron is stored on the body.

The disease can have many causes, but the presence of a genetic variant on the short arm of chromosome 6 is one of the most common causes of this condition.The gene variant is overexpressed due to its proximity to human A leukocyte (HLA) antigen A and increases iron absorption from the gastrointestinal tract. Defects in the production of gastric intrinsic factor with a genetic background can impair the absorption of vitamin B12. Deficiency of this vitamin also leads to a dangerous type of anemia called "pernicious anemia".
According to a number of studies, the ability to absorb vitamin D along with other fat-soluble vitamins, such as vitamins A and E, may be up to 34 times different for two different people.