



Impact and Importance of Nutrigenomics in Food Industry

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DESCRIPTION

Nutrigenomics is the scientific study of the genetic variations in how people react to the nutrients or bioactive substances in diet. Dietitian Sarah-Jane Reilly discusses how advances in the food business are being influenced by this research and analyses how nutrigenomic foods may find their way to consumers. To determine how the elements of a specific diet may alter the expression of genes in health and disease, nutrigenomics uses molecular methods like proteomics, metabolomics, and transcriptomics. The term "personalised nutrition" refers to a concept that is frequently used in relation to human health. This notion involves offering people specialised nutritional guidance, products, or services with the goal of promoting or preserving optimum health. Typically, this guidance is based on the person's genetic, phenotypic, and medical data. Recent commercial interest in nutrigenomics has increased consumer popularity of businesses like DNA Fit, Habitat, and Easy DNA.

The study of molecular connections between dietary cues and gene responses is known as nutrigenomics. Understanding how nutrition affects metabolic pathways and homeostatic control, how this regulation is disrupted in the early stages of a diet-related disease, and the amount to which specific genotypes that are sensitising to such disease contribute is helpful. It is a novel instrument for nutritional study and aids in reducing human health-related issues. Because each person has a unique DNA sequence, each person reacts to the environment uniquely. These genetic variations are the primary driving force behind the developing scientific field known as nutritional genetics or nutrigenomics. It has been discovered that there is very little genetic diversity. Only one base pair out of every 1000 in the nucleotide sequence of human DNA, or 0.1%, differs when the genetic sequences of two people are aligned and compared. Many of these changes are found in just one base pair or letter in the DNA code, such as Cytosine (C) in place of Guanine (G). Single-nucleotide polymorphism is the term used to describe this change involving a Single Base Pair (SNP).

Both micro and macronutrients have an impact on the expression and metabolism of genes and proteins. Which

particular signaling pathway a nutrient will activate is determined by its chemical structure. As a result, a modest alteration in a nutrient's structure can have a significant impact on which sensor pathways are activated. Closely comparable nutrients can have differing effects on cellular function, which is explained by the fine-tuned molecular specificity. An illustration of how the nutritional effects of fatty acids change based on their saturation level will help us understand this better.

The metabolic signals that the nucleus gets from both internal (hormones) and external (factors) determine which genes are turned on and which are turned off (nutrients, which are among the environmental stimuli). At the course of evolutionary development, the nutrients that the organisms ingested served as simple signals that activated or deactivated pathways for synthesis or storage during times of scarcity or plenty. Simple organisms preserved the capacity to react to nutrient or nutrient/hormonal cues that control the expression of genes encoding the proteins of energy metabolism, cell differentiation, and cell development as they evolved into complex forms of life. Many different environmental factors, including nutrition, can cause genomes to change. Therefore, minerals, micronutrients, and phytochemicals present in diet may have a significant impact on and influence the expression of genetic information. Therefore, it is evident that imbalanced diets change nutrient-gene interactions, raising the likelihood of chronic disease development. Future study and practice in human nutrition will be altered by the rapidly expanding field of nutrigenomics. The human genome is an average representation of the genes in humans, yet each individual's genome differs significantly from the average in many ways. The ability to adapt to food-based interventions and individual variations in dietary requirements will be better understood with the aid of nutrigenomics profiling.

By identifying specific groups with unique nutritional demands and revealing novel nutrient gene interactions, nutrigenomics approach will improve human health in the short and long term. It will also help build new diagnostic tools for unfavorable diet-related reactions. It is anticipated that nutrigenomics would produce biomarkers for health, early biomarkers for disease

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propensity, dietary responders and non-responders, and bioactive food components. Undoubtedly, nutrigenomics research is still in its infancy, and much more work needs to be done to properly

understand the mechanism and get over any obstacles or limits that may be present.