

Chapter 8

Nutrigenomics and Nutrigenetics and the Medicinal Values of Vegetables and Fruits

ABSTRACT

Since the accomplishment of the human genome sequencing project by March 25, 2003, nutritionists, biochemists, and modern genome epidemiologists became involved in genome-based nutritional research studies. In fact, the completion of a high-quality, comprehensive sequencing of the human genome derived from the discovery of the double-helical structure of the DNA became a landmark event that has influenced several realms of academic research disciplines and their applications to maximize public health and minimize harm to health care consumers.

INTRODUCTION

The phenomenological approach has been adopted to investigate the concept of nutrigenomics and nutrigenetics regarding the medicinal values of fruits and vegetables in terms of worldwide application of basic foods to promote human health and minimize the onset of the incipient stages of diseases. Innovatively, within the realm of public health genomics, the influence of nutrients on human gene expression is characterized as nutrigenomics. While the heterogeneous response of gene variants to nutrients, dietary components and developing nutraceuticals is called nutrigenetics. At a global scale, genetic variations have been observed to affect food preferences and tolerance among human groups from several regions of the world. These ecological, environment and other haplotype characteristics influence dietary requirements, preferences, and metabolic tolerance between the onset of diseases in human groups and individuals. Essentially, nutrigenetics characterizes the genetic profile, which has an impact on how the human body reacts to bioactive food components by modifying or influencing absorption, metabolism and site of action (Farhud et al., 2010). Specific illustrations of known phytochemical nutritional applications have been illustrated regarding their efficacy and control of hypertension and high blood pressure, which is one of the leading pandemic disease and the precursor for the

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incipient onset of cardiovascular disease, stroke, type 2 diabetes, and other nephritic syndromes. The relevance of nutritional epidemiologic techniques in the elimination of vitamin-deficiency diseases was outlined. Besides, the quantitative techniques for detecting and diagnosing these diseases were meticulously illustrated and the relevance of prompt referral of at-risk patients to physicians and other clinicians was resounded.

A monumental scientific feat of the twenty first century has been the accomplishment of the Human Genome Sequencing Project (HGSP) by March 25, 2003 which led to numerous scientific breakthroughs. Evidently, those economically sufficient industrialized nations in a breathtaking manner rapidly developed numerous genome sequencing technologies. The human genome sequencing project, which began in 1990, involved highly committed scientists from several parts of the world and led to the generation of a high-quality reference sequence for three billion base pairs of nucleotide sequences, which make up the human genome. From this scientific project, geneticists, molecular biologists, and modern genome epidemiologists revealed the DNA sequence present in a genome contains the complete code, which determines specific genes and proteins that are present in human cells. The scientific feat achieved from the HGSP has led to the advancement of science and the requisite technologies to improve clinical therapeutic interventions to enhance human health and cure hitherto chronic and degenerative diseases. Human genome sequencing has increased and enhanced the emergence of commercial genomics, as well as the analysis of the rise of the biotechnology subsector in this era of genomic science.

In spite of the innovations derived from genomics, biochemists and modern genome epidemiologists have specific functions to play in creating awareness about the global ecological phenomenon and the cultivation of fruits and vegetables which, for several years, have been utilized for their medicinal properties. Advances in genomics and the biochemical analysis of these foods have revealed their naturally phytochemical nutrients, which have specific therapeutic impacts against high blood pressure, stroke, certain forms of cancers, scurvy, several topical infections, gastroenteritis, atrial fibrillations, and associated chronic and degenerative diseases.

Many fruits and vegetables have the ability to interact with and modulate specific molecular mechanisms which guide an organism's physiological functions. In the age of genomic science, it is this awareness of the incipient stage of nutritional scientific breakthrough that has spurred a revolution in the field of nutrition.

Nutritionists and biochemists have crucial roles to play in public health genomics because large-scale population-based epidemiological studies involving nutritional interventions may use imprecise but comprehensive data without insights from genetic knowledge. In addition, erroneous scientific conclusions and misinformed nutritional recommendations could be made in very dire clinical settings (Wahli & Williamson, 2005).

Quite emphatically, to avoid such clinical issues and conscientiously research the relationships between genes and diet, the field of nutrition has been to capitalize on harnessing innovative genomic technologies, bioinformatics, and supporting analytical software and other sophisticated statistical tools to conduct meaningful nutritional studies which have the potential to unravel hitherto unknown scientific facts about fruits and vegetables that we consume for healthy living.

Naturally we consume these fruits and vegetables to maximize human healthy living and to eliminate potential protein energy malnutrition.

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