NUTRIGENOMICS Step Forward for a Personalised Nutrition

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Summary

The hunt for a single macronutrient Or micronutrient that will prevent chronic diseases is destined to fail. It is more likely that dietary imbalances - from micronutrient deficiencies to overconsumption of macronutrients or dietary supplements - are the modifiers of metabolism and potentiators of chronic disease.Although the complexity of food and genotypic variations appear daunting, molecular and genetic technologies that may provide the means for identifying causative genes (or their variants) and the nutrients that regulate them. The use of genomics to investigate diet and gene interactions involved in health or disease, often used interchangeably with nutritional genomics.This term implies that other portions of the genome play a role in the genetic response to a nutrient (even if researchers cannot assess the total genome).There is no Conclusion yet as it is on going study, Practice application is required further to conclude it, learning points are specified and can be implemented subject wise.Below article and Research is in new window as it is required much needed attention with perspectives that can be further discussed while practicing towards the research accomplishments.

Introduction:

The mission of the Center(NSRCC Reg. No: 53184458K) is to reduce and ultimately eliminate health disparities through the study of diet-genome interactions as they relate to chronic disease and certain cancers.The Center has now begun translating the results of nearly seven years of research, training and education on diet-genome interactions into tangible benefits that can prevent disease and improve human and animal health andwellness, with an objective to study towards the genetically effects and modification snutritionally. The link between food and health is well documented but people still struggle to find the right balance between energy intake and energy expenditure. Whether its malnutrition or over-consumption, people are looking for disease preventing and health promoting foods that match their lifestyles, cultures and genetics. Nutritional genomics is a systems approach to understanding the relationship between diet and health and will ensure that everyone benefits from the genomic revolution.

Nutritional genomics or nutrigenomics, is the study of how foods affect our genes and how individual genetic differences can affect

the way we respond to nutrients (and other naturally occurring compounds) in the foods we eat.Nutrigenomics has received much attention recently because of its potential for preventing, mitigating, or treating chronic disease, and certain cancers, through small but highly informative dietary changes.

The promise of nutritional genomics **is personalized medicine and health** based upon an understanding of our nutritional needs, nutritional and health status, and our genotype.Nutrigenomics will also have impacts on society "from medicine to agricultural and dietary practices to social and public policies" and its applications are likely to exceed that of even the human genome project. Chronic diseases (and some types of cancer) may be preventable, or at least delayed, by balanced, sensible diets. **Knowledge gained from comparing**

diet/gene interactions in different populations may provide information needed to address the largerproblem of global malnutrition and disease.

Aging : Additional information on nutrient regulation of gene regulation evolved from the field of longevity research. Key genes involved in aging are regulated through SIRT1 (sirtuin1), a gene first found in yeast. SIRT1 "monitors" the energy balance in the cell through the ratio of NAD+/NADH. Caloric restriction increases NAD levels which activates SIRT1. The protein encoded by this gene is a histonedeactylase which alters chromatin structure and hence expression of genes. In yeast and other model systems, calorie restriction increases life span.

Biocomputation : Biocomputation converts data into knowledge. Literature, Information provided in relate to the subject "Nutrigenomics" how it can be effectively coordinate living.The processes of life are determined through interactions between the organism's genetic makeup and multiple environmental variables.Identifying the positive and negative connections between the common constituents of our diet with genetic determinants of health and disease (as influenced by environmental factors), makes nutritional genomics a high dimensional problem. This is because nutritional genomics datasets are large, complex and nonlinear.The sources of nutritional genomic complexity are many and may beincluded:

(1) seasonal variations in food selection and content, (2) food fads and public response to news, studies and ads, (3) food preparation and cooking, (4) cultural and religious practices, (5) socio-economic status, (6) access to health care, (7) age and health status, (8) exercise and life-style, (9) disease complexity,(10) genetic background.

Diet alters expression of genetic information: Dietary chemicals have been shown to alter gene expression in a number of ways. For example, they may:- Act as ligands for transcription

factor receptors - Be metabolized by primary or secondary metabolic pathways thereby altering concentrations of substrates or intermediates or - Alter signal transduction pathways Exogenous nutrients can affect gene expression directly or indirectly.This was convincingly demonstrated by comprehensive investigation of yeast gene expression using microarrays. Adiauxic shift from fermentation respiration resulted in, metabolic reprogramming that identified genes previously unassociated with nutrient utilization. Although morecomplex than yeast, we believe the constellation of genes that make up the human genome respond in asimilar fashion to the dietary chemicals.

Epidemiology: A Basis of **Nutrigenomics,** Although the primary focus of nutritional genomics is nutrient-gene interactions, environmental factors have long been known to contribute to the development of chronic diseases. Discriminating between various environmental factors and nutrient-gene interactions is the challenge facing the epidemiologist, biostatistician and bioinformaticist. Examples of environmental factors include high-risk behaviors like smoking and substance abuse, exposure to toxins, socio-economic status,sleep time and continuity, stress, altitude changes, and physical activity. Epidemiological studies have been helpful in identifying environmental factors associated with incidence or severity of certain diseases.

Nutrigenomics & Health Disparities Nevertheless allele frequencies do differ among ancestral groups and therefore certain gene variants are more common in some populations than in others. One example illustrates the point: a polymorphism (A-6G) in the angiotensinogen (ANG) gene that has a higher frequency in Africans and their descendents causes homozygous (AA) individuals to be more susceptible to dietary salt (NaCl) than those without the polymorphism The NIH DASH Eating Plan helps control blood pressure and is more effective in these AA ANG individuals.By analyzing nutrient-genotype interactions, nutrigenomics may provide valuable information for individuals of with different metabolic genotypes - regardless of skin color - to optimize their choices of food.

These same concerns and concepts can be applied globally (see Public &International Health).

Results : Human studies showing associations between amount and type of fat and prostate, colorectal,breast cancers are inconsistent.

Laboratory animal studies in which genotype and environment can be more rigorously controlled consistently show that type and level of dietary fat are associated with incidence and strongly associated with promotion of certain cancers.Molecular studies that rely upon candidate genes identified from diet- and genotype-controlled laboratory animal

studies may provide better candidate genes for human molecular epidemiology studies examining the role of dietary fats in human Cancers. Differencesbetween otherwise identical macromolecules.Usually refers to changes in DNA.

Application of Nutrigenomics for Personal and Public Health: The application of nutritional genomics to personal and public health poses ethical issues similar to those of pharmacogenomics, particularly with respect to genetic privacy. In addition, some believe that the predictive power of a genetic test for diet advice is too low to be of concern. However, as we decipher the complex biology of gene-nutrient and gene-gene interactions, the probability of identifying disease susceptible increases: genetic testing may identify individuals with predisposition to diet induced disease. The biggest ethical and practical issue facing the application of the results of nutrigenomics research is timing:when is there a sufficient amount of results and knowledge available to interpret genetic tests. These issues require dialogue among all stakeholders.

Need for Nutrigenomics Science & Applications: Many nutrigenomic researchers expect that addressing the health issues in developed countries must be done by comparing different genetic makeups and environments throughout the world.As a part of that analyses,differences observed among different ancestral populations are likely to identify nutrients and supplements best suited for individuals sharing similar nutrigenomic profiles regardless of their geographic origin.Such evidence-based nutrient recommendations can then be developed for subgroups in a population allowing those individuals to by-pass the deleterious diets developed and consumed by privileged countries.

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