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Announcement

Pacific Group Plans Longitudinal Studies and an International Conference on Food, Genetics and Pathogenesis of Diseases

(Presumptive Note)

Bhagwati Prakesh Sharma

Group President, Planning and Control
Pacific Group of Universities, Udaipur, Rajasthan, India

Email: bpsharma131@yahoo.co.in

Food and nutrients either directly or indirectly through genetic variation in the humans can lead to pathogenesis of a variety of diseases, including cardio-metabolic, psychosomatic, somato-psychic and even malignant aliments. Though, nutrients and foods usually interact with genes in a benign manner, but sometimes, this interaction can have fatal outcomes"[1]. Therefore, diet, genetics and disease studies are gaining significance world over with the coming up of ever newer evidences that "nutrition can contribute to disease pathogenesis directly as well as indirectly genetic variation[2]. Increasing number of cardio-metabolic deaths are largely linked to eating habits of people. Nutrigenomic and nutrigenetic studies have been exploring interaction between nutrients and genes.

In view of this, the **Pacific Group of Universities proposes to study food borne, dietary, nutritional, nutrigenomic and nutrigenetic etiology of aliments and diseases along with an international conference.**

DIETARY CHANGES AND INCREASING PREVALENCE OF CHRONIC DISEASES

Drastic changes are taking place in the human diet from traditional and ethnic foods to a wide range of pre -cooked and packaged foods. It is associated with an "unparalleled increase in the prevalence of chronic diseases. Kitchen inventories have also been undergoing changes very fast. For instance, with respect to cooking inventories, till 1990s the cooking oils being used were mostly the mustard, groundnut, sesame, coconut etc. Today, the share of these conventional oils has come down to one fourth, as 50% of these conventional oils have been replaced by palmolein and 25% by the soybean oil. **Soyabean oil has recently been linked to genetic degeneration in the brain, leading to retardation of as many as 100 genes[3]. Likewise, palm oil is also being linked to atherosclerosis as well as certain aliments of heart, liver and kidneys, including cancer after culinary use [4].**

Food Nutrients and Health Studies are Vital: The nutrients in food enable the cells in our bodies to perform their necessary functions. These nutrients are nourishing substances in food that are essential for the growth, development and maintenance of body functions. Nutrients give our bodies instructions about how to function. In the sense, food can be seen as a source of information "for the body[5]. Thus, nutrition goes beyond calories or grams, and good foods or bad foods.

Nutritional Genomics is Vital for Future Generations' Health Profile: Nutritional Genomics has gained much significance because, food induced genomic changes, including gene expressions(s) and gene variations not only affect the health and eruption of diseases of the person eating those foods, but his or her off-springs and later generations might also suffer from a host of health related problems. Nutritional genomics comprises nutrigenomics and nutrigenetics - these would be explained little later in this article.

Palm oil and Disease Pathogenesis: Palm oil contains 52 percent saturated fatty acids and is therefore considered hazardous to cardiovascular health. Oxidized palm oil

presents even greater health risks. **The oxidization in palm oil occurs during processing for culinary use, generating toxins that adversely affect the heart, liver, kidneys and lungs[6]. Though, raw or unprocessed palm oil isn't associated with these effects when fresh; however, studies link a boost in atherosclerosis development in as little as six months when reheating of palm oil occurs to cook foods. Palm oil can reduce the effectiveness of medicines designed to reduce blood clotting, such as warfarin, enoxaparin and dalteparin[7].**

Moreover, carcinogenesis from palmolein is also emerging as major health concern[8]. Processing and heating of palm oil causes glycidyl fatty acid esters (GEs) to form. When digested, these GEs break down and release glycerol, known for its carcinogenic effects in animals. The same may be suspected in humans.

Soybean Oil and Genetic Degeneration in Brain: In a recent study at the University of California (UC) at Riverside, researchers reported a link between soybean oil and genetic changes in the brains of mice. Researchers in 2015 examined the potential contribution of soyabean to cause obesity and diabetes and reconfirmed it. Soybean oil has shown impact on the brain, especially changes in the hypothalamus, a brain region associated with a number of functions like body weight, metabolism, body temperature, reproduction and stress response. **The researchers also concluded that certain genes in the mice that were given soybean oil weren't operating properly. Identifying about 100 of them, they noticed one particular gene that produces oxytocin, also known as the love hormone and essential for parent-child bonding seemed to be impaired in mice that ate soybean oil. Among those mice, oxytocin levels were lower than normal, when the researchers tested coconut oil on the mice. They found, it didn't produce as many gene changes in the hypothalamus as the soybean oil did[9,10].**

FOOD, GENE EXPRESSION AND GENETIC VARIATION

The interaction between nutrition, metabolism, and gene expression is mandatory for maintenance of body homeostasis. Nutrition related or dependent disorders have been reported to be the result of a combination of nutrients with multiple genes not with single gene[11,12]. Genetic variation is the major basis for person-to-person divergence in response to diet. Understanding how genetic variation influences gene expression and recognizing genetic variants as risk factors for human nutrition dependent or related disorders is the focus of nutrigenetics[13].

NUTRITIONAL GENOMICS

Nutrition is found to define and mark the gene expression and metabolic responses with marked effect on the individual's health condition and susceptibility to disease[14]. Nutrients also regulate the transcription factors that modify the gene expression, up or down, consequently, adjust the metabolic responses at the molecular level. Nutritional Genomics comprises Nutrigenomics as well as Nutrigenitics.

Nutrigenetics explains mechanism by which genetic variations define the risk of individual to diseases, nutrient daily requirements, cellular metabolic response and behavior towards the bioactive dietary components or nutritional therapy. The main target of that is to clarify the impact of the gene variability on the interaction between nutrients and diseases. Nutrigenomics explains the genome-broad impact of nutrition, especially the functional effect of various food components on the (- omes) branch of science including genome, transcriptome, proteome, and metabolome[14].

DIET AND CARDIO-METABOLIC DISEASE RELATIONSHIPS

It is well established that excess sugar, salt, or fat in diet raise the risk for certain diseases. Healthy eating lowers risk for heart disease, stroke, diabetes, and other health conditions. A healthy eating for humans indeed comprises vegetables, fruits, whole grains, and fat-free or low–fat dairy products; includes beans, eggs, and nuts; with less saturated and trans fats, sodium, and added sugars[15]. The major cardio-metabolic diseases, stroke and type 2 diabetes are largely related to food and anxiety, etc.

In U.S., the highest percentage of cardio-metabolic disease-related death (9.5%) was related to excess consumption of sodium. Not eating enough nuts and seeds (8.5%), seafood omega-3 fats (7.8%), vegetables (7.6%), fruits (7.5%), whole grains (5.9%), or polyunsaturated fats (2.3%) also increased risk of death compared with people who had an optimal intake of these foods/nutrients. Eating too much processed meat (8.2%), sugar–sweetened beverages (7.4%) and unprocessed red meat (0.4%) also raised the risk of heart disease, stroke and type 2 diabetes related deaths[16].

NUTRIENTS, GENES AND DISEASE PATHOGENESIS

Nutrigenomics and nutrigenetics explore the interaction between nutrients and genes. This may reveal the genome wide effects of nutrients on transcriptome, proteome, and metabolome in cells, tissues, or organisms. It may also be useful in understanding how nutrients can affect the metabolic pathways and how these regulations can be inhibited in the early phase of diet–related and diet – dependent diseases[17]. Major Findings of nutritional genomics reveal that how diet ingredients change the gene structure and or gene expression, and consequently the human genome. Besides the genes dependent on dietary factors in its regulation may have a role in the commencement, extent, advancement, and progression of chronic diseases[18].

APPENDIX: SOME EXAMPLES OF NUTRITIONAL GENOMICS

Examples of Nutrigenomics: Dietary cholesterol performs an inhibitory effect on the transcription β- hydroxy- β methylglutary-CoA reductase gene. Dietary polyunsaturated fatty acids repress mRNA production of fatty acid synthase in hepatocytes through decreasing mRNA for lipogenic enzymes. This process depends on the degree of instauration of fatty acids[19].

Phenylketonuria is an example of single gene mutation. And such patients should avoid phenylalanine-rich food. Many Asian populations have the problem of deficiency of the aldehyde dehydrogenase enzyme, which is responsible for metabolism of ethanol. This leads to an annoying manifestation in affected individuals after ingestion of alcohol[20].

Examples of Nutrigenetics: The methyletetetrahydrofolate reductase gene (MTHFR) is a well-defined example of a gene-nutrient interaction. MTHFR is involved in the metabolism of folic acid and maintenance of the normal blood level of homocysteine. A particular MTHFR gene SNP is associated with elevated homocysteine levels in the blood of carriers, especially if there is a dietary deficiency of folic acid[21].

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