

REVISIÓN

Prologue: Nutritional genomics for understanding the interaction of dietary lipids and chronic diseases

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Dietary lipids are a highly digestible and concentrated source of energy which supplies, additionally, essential fatty acids, phospholipids and sterols required for growth, survival and the normal metabolic function of the organism. There is a growing awareness that some of the early lipid nutrition studies were not of the best design, that conclusions sometimes went beyond the experimental evidence, that the lipid hypothesis for cardiovascular disease, for example, is far from the whole story, and that early conclusions about cholesterol and saturated fatty acids need to be reconsidered. Modern nutritional research has evolved from a discipline that determines the required daily intake of calories and essential macro- and micro-nutrients to nourish populations, into a biochemical science with a high potential for health promotion and disease prevention of individuals through diet. That is, food recommended for one population may not be optimum for every member because of the genetic heterogeneity of the human species. Analyzing and understanding gene-nutrient interactions is therefore a necessary step for designing optimal diets that allow to maintain health and prevent diseases for each individual.

As a consequence of these ambitious objectives, “nutrigenetics” and “nutrigenomics” disciplines have evolved. Nutrigenetics study how individual genetic variations, manifesting as single nucleotide polymorphisms (SNPs), copy-number polymorphism (CNPs) and epigenetic variations affect susceptibility to diet. Nutrigenomics study the interactions of dietary components with the genome and the resulting changes in gene expression, structure, and function of proteins and other metabolites. One objective of nutrigenomics is integrating genomics (gene analysis), transcriptomics (gene expression analysis), proteomics (global protein analysis) and metabolomics (metabolite profiling) to define a healthy phenotype. As the science progresses, nutrigenetic and nutrigenomic information will be used to create dietary interventions tailored to an individual's genotype in order to prevent, treat, and even cure disease.

These series review the scientific evidence in relation to the importance of lipids in nutritional genomics and how they influence chronic diseases like cardiovascular disease and inflammatory bowel disease. These are just a few studies that are helping to understand the interaction of genes or proteins and lipids that will aid to the development of new nutritional strategies for preventing or attenuating these diseases in the future.

The first review by B. Knoch, M. Barnett, NC. Roy and WC. McNabb entitled “Study of the effects of dietary polyunsaturated fatty acids: Molecular mechanisms involved in intestinal inflammation” focuses on the complex interaction between dietary polyunsaturated fatty acids, inflammatory and immune responses in intestinal inflammation and the regulation of intestinal gene expression in animal models of inflammatory bowel disease. The second review of this series by D. Corella entitled “Diet-gene interactions between dietary intake and common polymorphisms in determining lipid metabolism” describes some of the advances in nutrigenetics in relation to gene–diet interactions between common SNPs at candidate genes of cardiovascular disease and dietary factors (total fat intake, polyunsaturated fatty acids) related to lipid metabolism. The third review of this series by G. Rodriguez-Gutierrez and B. de Roos entitled “Dietary fatty acids affecting hepatic metabolism and atherosclerosis-mechanisms unravelled using a proteomics approach” is dedicated to the role of dietary fatty acids (monounsaturated fatty acids, conjugated linoleic acid, elaidic acid and polyunsaturated fatty acids from fish oil) in the nutrient control of hepatic and plasma protein expression in animal models and humans. The fourth review by S. Lopez, A. Ortega, L. Varela, B. Bermudez, FJG. Muriana and R. Abia entitled “Recent advances in lipoprotein and atherosclerosis: A nutrigenomic approach” describes recent studies using a nutrigenomic approach to reveal the pathophysiological effects that fasting and postprandial lipoproteins isolated after the ingestion of meals with different lipid composition may exert on the formation of the atheroma plaque.