

# Nutrigenomix

Finding Health



The study of the structure and function of genes and the role genes play in health and disease.

## What is the Study of Nutrigenomics

by nutritionist Antoinette Foster

The interaction between the human body and nutrition is an extremely complex process involving multi-organ physiology with molecular mechanisms on all levels of regulation (genes, gene expression, proteins, metabolites). Only with the recent technology push have nutritional scientists been able to address this complexity. Both the challenges and promises that are offered by the merge of 'biomics' technologies and mechanistic nutrition research are huge, but will eventually evolve in a new nutrition research concept: nutritional systems biology. This information describes the principles and technologies involved in this merge. Using nutrition research examples, including gene expression modulation by carbohydrates and fatty acids, this review discusses applications as well as limitations of genomics, transcriptomics, proteomics, metabolomics, and systems biology. Furthermore, reference is made to gene polymorphisms that underlie individual differences in nutrient utilization, resulting in, e.g., different susceptibility to develop obesity.

### Nutrients Modulate Gene Expression

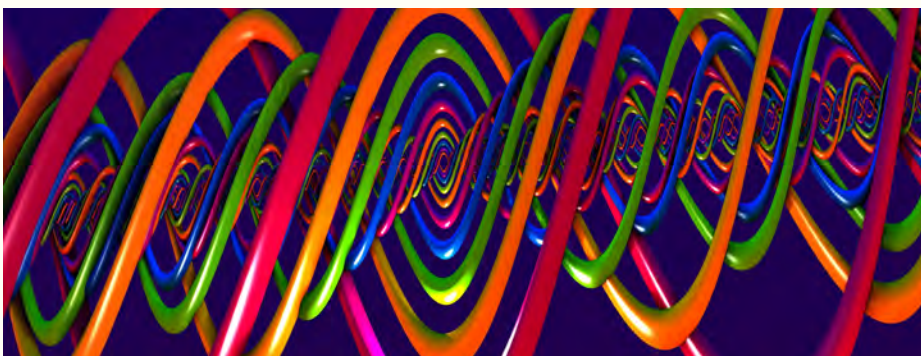
The adaptations of energy metabolism to the quality and quantity of food imply the modulation and/or emergence of metabolic pathways. Many of these adaptations indicate a change in the amount of a given protein. This is usually achieved through a change of the transcription rate of the corresponding gene. It has now been demonstrated that major (carbohydrates, fatty acids, amino acids) or minor (e.g. Fe, vitamins) dietary constituents participate in the regulation of gene expression in response to nutritional changes. Nutrients modulate the activity of transcription factors, or the secretion of hormones that in turn interfere with a transcription factor (transcription factors are proteins that bind to specific DNA sequences located within the promoter region of genes and can activate or inhibit their transcription). Most of our knowledge on the effects of nutrients on gene expression has been acquired in animal models. Below are two examples of gene regulation by carbohydrates and lipids, which are characteristic of the transcriptional mechanisms involved.

A once only saliva test and profile report to identify patients who are at risk for single-gene and complex disorders that have nutritional implications;

Understand how genetic variants interact with nutritional factors to affect disease risk and progression;

Assess an individual's response to a particular food or diet plan, for example, ProSports analyses gene variations with known nutritional interventions. For example: The percentage of polyunsaturated fats in the diet modulates genes involved in the regulation of HDL-cholesterol. A Mediterranean diet is not recommended for fifty percent of the population, this may include olive oil, red wine and fish oil.

ProSports DOES NOT report disease risk, but does provide personalised nutritionally relevant information to allow individual interventions.



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## BENEFITS OF NUTRAGENOMIX™ TESTING

Allow early identification of individuals at risk:  
Provide specific dietary recommendations-  
Nutrigenomics  
Initiation of early therapy  
Treatment accuracy & effectiveness-  
Pharmacogenomics  
Avert prematurely genotype-phenotype illnesses  
Prepare for healthy longevity!  
Physio-Genomic nutrition/stress/exercise responses  
Improved brain function, increase exercise response  
and healing, improve stamina and performance  
Determine those individuals, most at risk with ongoing  
injuries including concussion, healing time and long  
term effects  
Preventative Health  
Predictive Health  
Reduced Inflammation  
Improved Cognition  
Improved Detoxification  
Improved Cellular Health  
Improved Bone Health  
No unnecessary supplementation  
Optimal Sports Performance using exercise and  
nutritional based gene manipulation

## Finding Health- We all need it!

The goal for dietetic practice is to personalize diet (food and nutrients) interventions to prevent or modify an individual's disease susceptibility.

Nutrigenomics holds promise in treating and preventing multifactorial and single gene disorders and in targeting nutrition therapy.

However, the relationship between what we eat and our genetic profiles and the risk of developing chronic disease is complicated and not well delineated. The field is moving rapidly so it is important to have a basic understanding of where the science is now, and how to keep up with new research in order to help people make informed choices.

There is no doubt that nutritional genomics will have a tremendous impact on dietetic practice with advanced technologies allowing scientists to investigate all genes, proteins and metabolites in relation to each other.

Educating practitioners and students and the next generation of students and interns should be a priority for the profession. Those practicing today will be the pioneers in this emerging discipline that combines the effects of genes and environment (especially diet and physical activity) on health and disease.

