

**- NUTRIGENOMICS KIC**  
**The Genome–Food Interface. Premise for Improving the**  
**( Knowledge Innovation Community) an Innovative Network for a COST ACTION .**

by: Paolo Manzelli [p.manzelli@gmail.com](mailto:p.manzelli@gmail.com) ; <http://www.edscuola.it/lre.html> ;  
<http://esserebelli.net>

- **PRESENTATION** : Transdisciplinary COST – EU Action , in LIFE-SCIENCES both to meet economic and social needs and to contribute to the development of scientific and technological fields of Nutrigenomics.
- **Keywords** : Nutrigenomics, Nutrigenetics , Single-nucleotide polymorphism, Crohn's disease, Nutraceutical and Functional Foods, wide innovation community .



<http://www.citrusextracts.com/phoed/671546.jpg>

It is well known that modern Nutritional -Genomics (NUTRIGENOMICS) investigates the interaction between nutrition and the genome modulation , thereby combining nutritional research with functional genomics. So that the aims of the innovative network (NUTRIGEN-KIC) are (A) to disseminate and to favor the exploitation about the innovative correlation of heterogeneous effects of nutrients with sequence variations in the genome and (B) to favor the exploitation on the investigations about all effects of nutrients and other food components on gene expression at a genome-wide scale. This complex field will provide important information as to the biological effects of food components, and to the functional consequences of genetic variance. Therefore this COST action will be addressed to a real current problems about nutrition , focused on improving the prevention of nutrition-related diseases, e. g. by establishing personalised nutritional recommendations.

The innovative approach of the NUTRIGEN -KIC action , is based on the developing the general understanding that genetic potential will eventually manifest as a chronic disease depending on a complex interplay between the human genome , style of life and environmental factors. This complex understanding is based on the the contemporary transdisciplinary knowledge of nutrigenomics scientific endeavor .

As a matter of facts genes are critical for determining life's function, and from the other hand nutrition modifies the extent to which different genes can be expressed and thereby nutrition modulates whether individuals attain the potential established by their genetic background.

Hence Nutrigenomics is (1) highly innovative science as the study of the effects of nutrients on the expression of an individual's genetic makeup, furthermore more specifically recent research are focused on nutritional factors that protect the genome from damage, so that the proposed N-KIC action is focused on the impact of dietary components on the genome. The dissemination of Nutrigen -Research is a important but need an activity oriented to to popularize and integrate the different specific profiles on Nutrigenomics that are subdivided in : the Proteomics e.g the studies on the proteome (that is the sum total of all proteins), and the Metabolomics. (where the metabolome is the sum of all metabolites) and also other specialized “-omics technologies”, like Transcriptomic, ( e.g. global way of looking at gene expression patterns at RNA's level ) etc..

Recently a new genomic's focus has been made on single-nucleotide polymorphisms (SNPs) (pronounced "snips"), e.g. The DNA sequence variations that occur when a single nucleotide (A,T,C,or G) in the genome sequence is altered (2) Dietary factors may differentially alter the effect of one or more SNPs, to increase or decrease disease nutritional risks in relation to well-defined ethnic groups that differentiate the mondial

population.

The intersection of the genomic and nutritional domains will require transdisciplinary research teams and sophisticated technologies, therefore it became a necessity for developing the Knowledge Based Bio economy to open a sharing of scientific research worldwide findings co-organizing ,through a Nutrigenomic's KIC ( Knowledge Innovation Community) a large dissemination of the great importance for the health and wellness of people, derived from knowing the integration between genomic and nutritional patterns in different populations and ethnic groups .

Henceforth the main goal of NUTRIGEN KIC ( or in simplest acronym : N-KIC) is to define the optimal dietary intake to develop a culture able to understand how nutritional deficiency or excess can cause genome mutations at the base sequence or chromosomal level in Nuclear DNA (n-DNA) and also in Mitochondrial DNA (mt-DNA) Finally The N- KIC would approach the improvement of studies on future research challenges on Diet–gene interactions, taking in consideration the interference of the environmental factors where are living cooperative host-bacteria that influence the activity of genes in co-organizing different regulatory patterns between diet and genotype.

These revolutionary changes in scientific knowledge were produced new techniques of functional genomics opening the post genomics era. In this context the N-KIC objective would provide powerful approaches to improve the exploitation of the complex relationships between bio-active molecules, genetic polymorphisms and biological system and can give rise to personalized nutrition and dietary recommendations. So that the NUTRIGEN KIC will contribute to the scientific , economic ,cultural ad societal development of the European Knowledge Based Bio Economy.

Significant problems of the N-KIC exploitation and dissemination will be to popularize advanced information on diet information for monogenic diseases (celiac , phenylketonuria, galactosemia, lactose intolerance etc.) in order to improve the prevention or treatment by the early identification of specific mutations or haplotype combinations (3) that modulate dietary response in affected subjects of chronic diseases.

Also significant new approaches will be taken in a context of exploitation and dissemination of N-KIC , in relation to multifactor diseases, like cardiovascular diseases (CVD), obesity, type II diabetes mellitus or cancer, etc.. in fact the nutrigenomics approach has begun to reveal that some of them are susceptible to dietary intervention and may modulate the onset and progression of disorders.

### **Nutrigenomics and Nutraceutical production**

The N-KIC activity is not only cover the scientific and technological improvement to meet social needs for health security but also a specific attention will be given to the Nutraceutical application of Nutrigenomics including fostering of their commercial exploitation. Remembering that *nutraceutical is a food or parts of foods that provide medical-health benefits, including the prevention and/or treatment of disease it is easy to understand that such innovative products can be better tailored from nutrigenomics and nutrigenetics sciences and may range from isolated nutrients, dietary supplements and diets to genetically engineered "designer" foods, functional foods, herbal products and processed foods such as cereals, soups and beverages.* Hence N-KIC will realize a plan for stimulating the growth of health ingredients and nutraceuticals segment that holds immense potential based on the production of high quality of Nutraceutical and functional food in a wide ranging of European of food processing industry. The plan would be included in a platform of information realized in terms of new investment and new food production development. This plan dissemination will be coupled with growing awareness amongst consumers about product developments in the global market in order to drive growth to both the traditional market of food production with the



production of new food ingredients in the long term perspective.

#### **BIBLIO ON LINE :**

(1) **Nutrigenomics** : <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2137135>

(2) **SNPs** : [http://www.ornl.gov/sci/techresources/Human\\_Genome/faq/snps.shtml#snps](http://www.ornl.gov/sci/techresources/Human_Genome/faq/snps.shtml#snps)  
see also: <http://www.youtube.com/watch?v=9rPDa2ACtoq&feature=related>

(3) [Haploid Genotype : http://en.wikipedia.org/wiki/Haplotype](http://en.wikipedia.org/wiki/Haplotype)

(4) [Nutraceutical -research : http://www.fimdefelice.org/archives/arc.needresearch.html](http://www.fimdefelice.org/archives/arc.needresearch.html)