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LETTER FROM THE EDITOR

Targeting a tailored therapeutic diet by means of nutrigenomics: future or reality?

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The Dietetics and Clinical Nutrition is a very complex science that concerns many branches, including the anthropological, biological, biochemical, genetic, gastronomic and ethical one. Because of these various aspects, it is very difficult to analyze, from a strictly scientific viewpoint, any effect of a diet or of different nutrients through the classic scientific studies based on cause–effect principle. It is easy, for instance, to observe a feverish subject whose temperature drops after aspirin intake, while it is more complex to examine how a particular diet may affect the progression of a disease, like the systemic lupus erythematosus.

And yet, how an anti-inflammatory diet low in calories and rich in omega-3 fatty acids may reduce the use of anti-inflammatory agent, like cortisone, in these patients; being a diet made of many elements, it is difficult to understand which nutrients are really effective, their correct quantity and ratio. It is then easier to study the effects of a drug versus placebo than the efficacy control of a diet or a set of nutrients against a chronic disease.

Therefore, the Nutrition research must take into consideration these numerous variables that seem considerably reduce the exact application of the scientific method.

In fact, the Nutritional research has recently developed large areas of interest, both in prophylaxis and treatment.

If some retrospective and prospective trials have lead the epidemiologists to stress how Mediterranean diet impacts in reducing the incidence of disorders such as cardiovascular disease, diabetes and some cancers, on the other hand clinicians have proven the effectiveness of nutritional therapies that utilize pools of nutrients (the so-called Nutritional Pharmacology) in improving some clinical situations, like the reduction of infections after surgery.

Nevertheless the answers are still unclear and ambiguous. The truth is the following: beside being what we eat (as Feuerbach said) also the food we eat produce some effects in our bodies, that vary in terms of epigenetics in relation with our genome. Taking as an example what above mentioned, some patients are responsive to omega-3 fatty acids with a reduction in interleukin-6, while others are not: the anti-inflammatory activity of omega-3 could not be highlighted in a study that does not check the genetic polymorphisms for the interleukin-6.

It is well known the fundamental role of nourishment for our health, but the interaction between genome and nourishment is still an unexplored field. Today, there is an emerging scientific field that can explain something more: the nourishment influence on our health is substantially determined by our genetic complement. This field is called nutrigenomics, and can also explain how similar food habits may lead to different health change in those who have chosen those habits: in practice, tons of food and nutrients taken may in time interact with our body, by improving or worsening our genetic characteristics written in our genome and may alter the response towards the environment itself through a mechanism called epigenetic. For example, a diet highly rich in calories and, in particular, in simple carbohydrates such as sugary drinks and sweets, leads to the development of a latent diabetes in subjects genetically predisposed through a depletion of the insulin constantly stimulated (epigenetic mechanism). Or, taking another example, the excessive consumption of animal fats leads to an excessive synthesis of cholesterol and hormones such as estrogens, which in subjects most genetically at risk of estrogen-dependent breast cancer may

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increase the risk of cancer recurrence in those patients who have undergone breast surgery.

Recently emerged articles have reported the essential role of the genetic analysis.

This would explain the reason of years-lasting debates between the supporters of low carbohydrates hypocaloric diet and those supporting the low fat one. With this regard, Grau et al. [1] have shown that the transcription factor TCF7L2 rs7903146 is related to type II diabetes and subjects with IRS1 polymorphism rs2943641 CC can obtain greater benefits of weight loss and improvement of insulin resistance than those without this genotype when they follow a diet low in fat and with a high carbohydrate content.

Moreover, as showed by the *Preventing Overweight Using Novel Dietary Strategies* (POUNDS LOST trial) [2], the polymorphism of the insulin receptor substrate 1 gene changes the insulin resistance in response to a hypocaloric and low carbohydrate diet compared to the low fat one.

Always the same group demonstrated how a receptor genotype (GIPR) rs2287019 variant of the glucose-dependent insulin tropic polypeptide [commonly known as gastric inhibitory polypeptide (GIP)] may cause hypernutrition, obesity, insulin resistance and type II diabetes [3].

Failed therapeutic results of an adjusted diet could easily be attributed to poor patient compliance, but Nagai et al. have shown that 3826 G allele of UCP1 uncoupling protein does not allow an acceptable weight loss in young women on a diet, as these patients show a very low basal caloric consumption [4].

For this reason, a good dietary treatment, and no more a careless attempt, is now becoming a target more and more optimal and the experiences reported by Arkadianos et al. [5] will be essential for non-responder patients.

Therefore, thanks to the huge development of epidemiology, biochemistry and genetics, Food Science has made great strides over the last 30 years and can be counted among the most dynamic scientific fields.

While the study of individual nutrients has brought interesting results, giving rise to the so-called Pharmaconutrition, the increasing development of genome analysis is leading to the identification of more specific food models tailored for groups or single subject, by the help of the so-called nutrigenomics and nutrigenetics that will allow to consider the diet as a more and more targeted therapy.

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