

## Nutraceuticals: Drugs called food

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### ARTICLE HISTORY

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“Nutraceuticals” is a word 35 years old, defined by its inventor (Dr Stephen DeFelice) as “a food (or part of a food) that provides medical or health benefits, including the prevention and treatment of a disease” [1]. The use of food as medicine is as old as humanity. Most animals use herbs and other natural products to care about their own health or to cure their diseases.

In Far East, both Traditional Chinese Medicine and ancient India's Ayurvedic tradition attributed a great emphasis on the importance of a well-balanced nutrition to preserve health. In the first case, food was a crucial element in maintaining the equilibrium between *yin* and *yang*, the two opposing forces, and obtain the *qi*, the saneness. Indians' classical medicine attributed magic properties to several foods in order to preserve prakriti (the natural individual constitution) and fight against the *vikriti* (the possible imbalances).

Ancient Greek medicine, well represented by the “father of modern medicine” Hippocrates, was strongly supported the idea of the Master: “...let food be thy medicine...” [2]. Galen, the most prominent physician of the Latins' culture, was the highest expression of the concepts suggesting the importance of functional food for health [3].

Not very differently, even if more organically, the Medieval Medicine was suggesting the importance of food to preserve health. A good example was represented by Avicenna (Ibn Sina), a Persian magician/physician/healer who deeply explored the effects of food, and its relationship with diseases [4].

Similar examples may be found in all the cultural backgrounds of the Indigenous Native Societies during the “Medieval Dark Ages”. The medicinal plants were especially famous, largely used in medicine and the art of cooking. The roots of the tradition are so deep that still today we talk about “medical herbs” or discuss about phytotherapy [5].

The biochemical discoveries on the properties of aliments, completed in the last 3 centuries, have made possible the advancements on this topic. Mixed with that, a better knowledge of the physiological necessities of human organisms has made clear several of the “scientific basis” of the ancient knowledges, based on tradition and observation of natural behavior of the animals.

More recently the research on the topic of nutrition and health has been addressed to special necessities of health. A clear example is represented by the important studies made on the necessities of postoperative patients. The possibility of complete parenteral nutrition, diffused at the beginning of the '90s, has significantly changed the clinical approach to the topic

and has made possible the nutritional treatment of postoperative patients that were not fed until that moment [6].

Of course, a good knowledge of the macronutrients, like carbohydrates, protein and fats, and their specific properties, has addressed in a scientific direction the large and complex topic of nutrition. A similar relevance had a better comprehension of the importance of micronutrients (such as minerals and vitamins), also highlighting how in some cases they may be responsible for birth defects if the pregnant women have a deficiency or an excessive assumption of some of them [7]. This represents a further demonstration of the crucial importance of the aliments, and how the clinicians should know perfectly well how to use them, as medicines.

Some of the new frontiers are represented by the study of the human body eco-system, trying to better explore what is the real role of the microbiome. The enormous quantity of micro-organisms also present in the digestive tract cannot be without consequences. They have a clear function in the elaboration of aliments and their absorption [8]. This symbiotic relationship is increasingly studied. The most intriguing aspects are represented by the natural, physiological development of the microbiome and how it is influenced by the diet since childhood [9]. Its impact on the development of food allergies is increasingly clear [10]. Moreover, it is well known how its physiological balance is altered by antibiotic therapy [11], and may be recovered with some specific food [12], or selected substances [13].

The studies on the effects of microbiomes on some specific chronic pathologies are equally intriguing [14]. Its influence on metabolic diseases is largely studied [15-18]. The data present at the moment in the literature show its importance in reducing cholesterol levels [19], but also its influence on gestational diabetes [20]. Its role in colorectal cancer is still debated [21]. The studies on its implications on the development of neuropathic pain have stimulated an enormous interest [22], especially for the high prevalence of this disease [23], its diagnostic difficulties [24], and its challenging management [25].

In conclusion, the scientific studies of recent decades have guaranteed the scientific basis for the ancient knowledge of primordial medicines. Much of the information we derived from them, related to the use of foods or special natural diets to treat certain pathologies, had at its basis a great wisdom deriving from the observation of what happened in nature, and now better and better we know why. This has proven to be what best and most naturally helps us cure certain pathologies and use food as medicine.

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## Disclosure statement

No potential conflict of interest was reported by the author.

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