

Chapter 2

Nutraceuticals: The Dose Makes the Difference – It's All in the Dose

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ABSTRACT

Nutraceuticals is now gaining attention as an alternate route to modern medicine. Accumulated evidence poses a great challenge for food chemists, nutritionists, food technologies and physicians as health authorities regard nutraceuticals a prominent tool for the maintenance of sound health and to detoxify nutritionally induced chronic and acute disease forms thereby promoting individual's quality of life. During the past few decades, the use of nutraceuticals has increased in industrialized countries. In low- and middle-income countries, nutraceuticals never stopped being important, often representing the only therapeutic system to which certain people could refer. This had created an urgent need that the conditions for the correct and appropriate use of nutraceuticals are put in place by educating stakeholders. If correctly applied (i.e., following criteria of safety, efficacy and quality), these methods could contribute to protecting and improving the perceived human's quality of life.

INTRODUCTION

“Nutraceutical” (DeFelice, 1992) is food or parts of food that provide medical or health benefits, including the prevention and treatment of disease.” It ranges from dietary supplements, isolated nutrients, and diets to genetically engineered food, herbal products and processed products e.g. beverages, cereals and soups.

Two categories of nutraceuticals (Hathcock, 2001; <https://nccih.nih.gov/>) exist, namely traditional and non-traditional. The traditional is simply natural or whole foods with new onset of information about their potential health qualities. Non-traditional nutraceuticals are outcomes of agricultural products. In both of these categories, it is the dose that makes the difference.

In high-income countries, nutraceuticals use declined at the end of the first part of the twentieth century, because of the development and production of synthetic drugs or medicines. Though new drugs have evolved over the last three decades, yet resistance to certain drugs still persists (Tyler, & Foster,

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1996). With the onset of herbs (Berkowitz, 1995) or medicinal plants as alternate routes, there seemed to be a plausible diverged pathway for the active components of herbs to lure microbes. During the past few decades, nutraceutical use has increased in industrialized countries. In low- and middle-income countries, it never stopped being important, often representing the only therapeutic system to which certain people could refer to. Yet still, there had been some unforeseen challenges in remote settings. For instance, same herbal extract prepared by herbal healers (Phondani, Maikhuri, & Kala, 2010) are not effective in treating the same ailments. It is important therefore to pay heed to the different methods by which herbal healers prepare the same extract.

A rural herbal healer's (Phondani, Maikhuri, & Kala, 2010) knowledge has been from trial and error and lots of human experimentation over decades about the best way to prepare effective herbal remedies. On several counts though, these herbal healers do not necessarily know the active component produced. All they know is that 'this extract cures this disease'. This is therefore imperative that scientists get around verifying what these herbal healers had maneuvered through over the years during their reactions and interactions and the different types of active components produced for student education and health policy implementation.

With this concept in mind, there is therefore an urgent call and the need for the correct and appropriate conditions and or use of herbs or phytotherapy to be in place (Talalay, & Talalay, 2001). If correctly applied (i.e. following criteria of safety, efficacy and quality), these procedures could contribute to the improvement of human's health (Table 1 and 2). Certain methodologies in current use (Nunez *et al.*, 2002; Bum *et al.*, 2004; Burkill, 1995; Sezik, Zor, & Yesilada, 1992; Christe, Godoy, & Prado, 2013; Ozcan, Ünver, Uçar, & Arslan, 2008; Chohan, Forster-Wilkins, & Opara, 2008) include: decoction of certain leaves e.g. *Solenostemon monostachyus* as diuretic; infusions (hot teas) for the treatment of arthritis; tinctures (alcohol and water extracts) for treating infections; strong decoctions (boiled teas); and macerations (cold-soaking). Nevertheless, extensive scientific evidences are still in progress (Table 1 and 2), with majority yielding effects on phenotypic and genotypic expressions (Table 2).

However, two questions remain: Can nutrigenomics be tailored to specific population well-being? Or is it possible to develop food products that could prevent the onset of complex diseases like cardiovascular disorders, cancer and the like? Thus, presently scientist are aiming to scrutinize herbal extract methodologies and the possibility of tailoring food for personalized nutrigenomics with two main objectives:

Table 1. Herbs used and their therapeutic relevance

Herbals (Botanical Source)	Therapeutic Activity
Aloe Vera gel (<i>Aloe Vera L. N.L.Burm.</i>)	Dilates capillaries, anti-inflammatory, emollient, wound healing properties.
Ephedra (<i>Ephedra sinica Stapf.</i>)	Bronchodilator, vasoconstrictor, reduces bronchial Edema.
Garlic (<i>Allium sativum L.</i>)	Antibacterial, antifungal, antithrombotic, hypotensive antiinflammatory
Licorice (<i>Glycyrrhiza glabra L.</i>)	Expectorant, secretolytic, treatment of peptic ulcer.
Ginger (<i>Zingiber officinale Rosc.</i>)	Carminative, antiemetic, cholagogue, positive inotropic.

Source: Tyler & Foster, (1996).

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