



Nutraceuticals' latest picture and their role in health

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A nutraceutical is any food or dietary supplement ingredient that provides a health benefit. It can be tea with ginseng, or it may be a soy product with an added level of isoflavones. At present, high quality, very good standardized grade herbal extracts qualify as nutraceuticals, but the term nutraceuticals as it stands today has become too wide to be useful. Nutraceuticals provide all the essential substances that should be present in a healthy diet for the human body. They have received considerable interest because of their presumed safety and potential nutritional and therapeutic effects, and they are available in the form of isolated nutrients, dietary supplements and specific diets to genetically engineered foods, herbal products and processed foods such as cereals, soups and beverages.

Nutritional deficiencies are of major concern to lawmakers across the developing nations. Rapidly growing population, poverty and starvation, and very low level awareness on nutrition are major hindrances for eliminating nutritional deficiencies. Iron deficiency alone affects two billion people across the globe, and deficiencies in zinc, iodine, vitamin

A, and calcium are other major health issues. Multiple strategies are available to overcome this situation, including food diversification, supplementation, fortification, and production of crops with enhanced levels of these micronutrients.

The concept of nutraceuticals commenced from the survey in United Kingdom, Germany and France, which concluded that diet is rated more highly by consumers than exercise or hereditary factors for achieving good health and fitness. In recent years, there is a growing interest in nutraceuticals that provide health benefits and are alternatives to medicines or drugs. Nutraceuticals often possess unique chemical actions that are unavailable in pharmaceuticals.

Nutraceuticals have many benefits over medicines because they avoid side-effects. Nutraceuticals, on the basis of their natural source and chemical grouping, are categorized mainly into three key terms – nutrients and herbals, dietary supplements, dietary fibers, etc. They are also categorised in dietary supplements, including botanicals. Functional foods, for example, yogurts with pro-biotics, drinks with herb blends,

soy beverages rich in proteins, etc., are a food category that is seeing the highest growth in energy drinks, healthy snacks and breakfast products. Prebiotics – oligofructose saccharides for control of intestinal flora; Omega-3 milk in prevention of heart disease; Canola oil with lowered triglycerides for cholesterol reduction; Stanols (benecol) in reduction of cholesterol adsorption. Fortification with vitamins and minerals is one of the most effective methods to improve health and fitness, and prevent nutritional deficiencies according to new studies. Malnutrition remains a huge challenge throughout the developing nations. The UNICEF adds that malnutrition in developing nations contributes to half of infant and child deaths. Adding essential vitamins and minerals to everyday food products such as flour iodine and salt can reduce the events of life-threatening diseases such as malaria and diarrhea.

Nutraceuticals and Health

Plant foods serve as a rich source of phenolic and polyphenolic compounds. The concentration of phenolics and polyphenolics is mainly in the skin and seeds of fruits, but leaves often provide a richer source

of phenolics. An example for this is blueberry leaves that are excellent sources of antioxidants. The leaves were more recently found to suppress the expression of hepatitis C virus RNA. In cereals and legumes, the bran portion is also dominant in phenolics as compared to the endosperm. The antioxidant potential of cereals follows a similar trend as is exemplified in pearled barley. Although the term antioxidant is frequently used by the public to describe the health benefits of phenolic and polyphenolic compounds, the mechanism(s) by which these effects are rendered is (are) not limited to their antioxidant

potential which may be described as their efficacy in scavenging free radicals, chelating pro-oxidant metal ions or acting as reducing agents.

It should also be noted that certain flavonoids may exert their beneficial

effects via a pro-oxidant effect. In addition, advanced glycation endpoints (AGEs) responsible for diabetes, cataract, neuropathy and the like are among the other mechanisms by which phenolics/polyphenolics are known to promote health. The phenolics occurring in foods may occur in the free, soluble esters and glycosides or insoluble-bound forms. In carrying out extraction operations, the latter group may not be easily procured, if proper procedures to release them are not followed. This may then lead to the underestimation of the reported results. Thus release of the insoluble-bound phenolics is essential.

Edible marine algae, sometimes

referred to as seaweeds, are of interest as good sources of nutrients including protein, long-chain polyunsaturated fatty acids (PUFA), dietary fibres, vitamins and minerals. More recently, many researchers have focused on marine algae and their constituents as nutraceuticals and functional foods for their potential health-promotion mostly attributed to their ω 3 fatty acids, antioxidants, and other bioactives. Although the majority of marine algae have low lipid contents, ranging from 0.3 percent in *U. lactuca* to 7.2 percent in *Caulerpalentillifera*, algal lipids are rich in PUFA such as C20:5 ω 3 (eicosapentaenoic acid, EPA



and C22:6 ω 3 (docosahexaenoic acid, DHA). The proportions of EPA and DHA in oils from *Skeletonemacostatium* and *Crypthecodiniumcohnii* were 41 percent and 37 percent respectively. While marine algae are primarily used for production of single-cell oil rich in DHA, and other ω 3 PUFA, the leftover material after processing contains a variety of antioxidative substances that can potentially be utilized as a source of natural antioxidants.

Polyphenols in green tea, known as catechins, account for 30 percent of the dry weight of tea leaves with epigallocatechin gallate (EGCG) being the most abundant (59 percent of total polyphenols). EGCG has a multitude of bioactivities and is highly hydrophilic

with poor solubility in lipophilic media, hence its absorption in-vivo is somewhat hindered. Acylation of EGCG with selected fatty acids was found to improve its lipophilicity, thus leading to its potential expanded application in more diverse systems such as fats and oils, lipid-based foods and cosmetics as well as biological systems, including better cellular absorption and bioefficacy under physiological conditions. Moreover, additional perspectives exist using health beneficial omega-3 (PUFA). The esters of EGCG with omega-3 PUFA, especially DHA, significantly improved the antioxidant and anti-

inflammatory activities of EGCG. Moreover, the EGCG-DHA esters totally arrested colon tumourigenesis in mice and exhibited anti-HCV (hepatitis C virus) activity which was 1700-folds greater than that of embelin as a positive control.

These findings strongly suggest that modified EGCG products are of great potential as novel ingredients for food and cosmetics and as nutraceutical/pharmaceutical applications. These findings have now been protected through a patent.

Nutraceuticals have proven their health benefits and disease prevention capability, which should be taken according to their acceptable recommended intake. In the present scenario of self-medication, nutraceuticals play major role in therapeutic development. But their success depends on maintaining on their quality, purity, safety and efficacy. **NS**