

## Neutraceutical the Main Element in Food-An Opinion

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### Opinion

Nutraceuticals are naturally present in foods as oral dietary components and are considered to have a medicinal or nutritional value. The concept was invented in 1989 by Dr. Stephen De Felice, who merged the terms 'nutrition' and 'pharmaceutical'. Nutraceutical may be described as a food (or part of a food) that provides medical or health benefits, including the prevention and treatment of a disease. Health Canada, on the other hand, describes nutraceutical as a food-prepared substance, but sold in the form of pills or powders (potions) or in other medicinal forms, generally not associated with food in general, is a food or part of a food that plays an important role in altering and preserving the normal physiological function of healthy human beings. Nutraceuticals help battle some of the century's biggest health issues, such as obesity, cardiovascular disorders, cancer, osteoporosis, arthritis, diabetes, cholesterol, aging of the skin, etc. Overall, nutraceutical has contributed to a new era in medicine and health, in which the food industry has become a field focused towards science.

### Classifying Nutraceuticals

Nutraceuticals may be categorized most frequently on the basis of food sources, mechanism of action, chemical composition, etc. Natural food sources are used as nutraceuticals, and can be classified as:

- Dietary Fibre
- Probiotics
- Prebiotics
- Polyunsaturated fatty acids
- Antioxidant vitamins
- Polyphenols
- Spices

#### Dietary fibre

Dietary fibre is the food source, more specifically the plant material, which is not hydrolysed by digestive enzymes, but digested in the gut by micro-flora. Non-Starch Polysaccharides (NSP) such as celluloses, hemicelluloses, gums and pectin,

lignin, resistant dextrin and resistant starch are mostly included in dietary fibres. Fruits, oats, barley, and beans are foods rich in soluble fibre. Chemically, dietary fibre means polymers of carbohydrates with a degree of polymerization that are neither digested nor absorbed in the small intestine.

#### Polyunsaturated Fatty Acids (PUFA)

PUFAs are often referred to as "essential fatty acids" as they are essential to the function of the body and are externally added via the diet. There are two sub-divisions of PUFAs: omega-3-(n-3) and omega-6-(n-6) fatty acids, Eicosapentanoic Acid (EPA), Docosahexanoic Acid, are the major omega-3 fatty acid (DHA). Fatty fish such as mackerel, salmon, herring, trout, blue fin tuna and fish oils, are rich in EPA and DHA. Linoleic Acid (LA), Gamma-Linolenic acid (GLA) and arachidonic acid are the main components of Omega-6-PUFAs (ARA). LA occurs predominantly in vegetable oils such as maize, soybean, safflower and sunflower. Animal products such as beef, poultry, and eggs contain ARA.

#### Probiotics

A probiotic can be defined as a live microbial feed supplement, which has a beneficial effect on the host animal by improving its intestinal microbial balance when given in adequate amounts.

The following bacteria categories are generally included in probiotics:

- Lactobacilli such as *L. acidophilus*, *L. casei*, *L. delbrueckii*
- Gram-positive cocci such as *Lactococcus lactis*, *Streptococcus salivarius*
- Bifidobacteria such as *B. bifidum*, *B. adolescentis*, *B. infantis*, *B. longum*, *B. thermophilum*

For the treatment of Gastrointestinal (GI) disorders such as

lactose intolerance, acute diarrhoea and antibiotic-associated GI side effects, probiotics are typically used.

### Prebiotics

Prebiotics are dietary ingredients which, by selectively changing the composition or metabolism of the gut microbiota, have a beneficial effect on the host. They are polysaccharides with short chains and have distinctive chemical structures that are not digested by humans. The ingestion of prebiotics usually stimulates the development of *Lactobacillus* and *Bifidobacteria* in the gut, thereby assisting in metabolism. Vegetables are rich in fructo-oligosaccharides, such as chicory roots, banana, tomato and allium. Improved lactose tolerance, antitumor properties, neutralization of toxins, and activation of the intestinal immune system, reduction of constipation, blood lipids, and levels of blood cholesterol are the health benefits of prebiotics.

### Antioxidant vitamins

Vitamins such as vitamin C, vitamin E and carotenoids are known collectively as vitamins with antioxidants. Both individually and synergistically, these vitamins work to prevent oxidative reactions that lead to many degenerative diseases, including cancer, cardiovascular diseases, cataracts, etc. In many fruits and vegetables, these vitamins are abundant and exert their protective action through free-radical scavenging mechanisms. Hydrogen atom and scavenge singlet oxygen and other reactive species are transferred by vitamin E consisting of tocopherols along with tocotrienols, thereby protecting the peroxidation of PUFA within the biological membrane and LDL. The synergistic function of vitamin E and selenium against lipid peroxidation is significant. Vitamin C, better known as ascorbic acid, provides lipid radicals with hydrogen atoms, quenches singlet oxygen radicals and eliminates molecular oxygen. Carotenoids such

as lycopene,  $\beta$ -carotene, lutein, zeaxanthin are known to be the biological systems' most effective singlet oxygen quencher without any oxidizing products being made.

### Polyphenols

Polyphenols form a broad group of phytochemicals that are produced by plants as secondary metabolites to protect reactive oxygen species from photosynthetic stress. Flavonols, flavones, flavan-3-ols, flavanones, and anthocyanin's are the most significant polyphenols. Dietary polyphenols are of current interest because substantial in vitro evidence has indicated that numerous cellular processes, such as gene expression, apoptosis, platelet aggregation, intercellular signalling, that can have anti-carcinogenic and anti-atherogenic consequences, can be affected. Apart from these, polyphenols also have antioxidant, anti-inflammatory, anti-microbial, cardio protective activities and play a role in preventing neurodegenerative and diabetes mellitus diseases.

### Spices

Spices are esoteric adjuncts of food that have been used to improve the sensory quality of food for thousands of years. They give foods characteristic flavour, aroma, or piquancy and colour, stimulating our appetite, and modifying food texture. Recent research shows that dietary spices have an enormous impact on human health through their antioxidant, chemo preventive, anti-mutagenic, anti-inflammatory, immune modulatory effects on cells and a wide range of beneficial effects on human health through the action of gastrointestinal, cardiovascular, respiratory, metabolic, reproductive, neurological, and other processes. Terpenes and other constituents of essential oils are the bulk of the spice elements.