NUTRACEUTICALS

Nutraceuticals

- Nutrients and nutritional components which are prepared in pharmaceutical dosage forms and used for therapeutic purposes.

Nutraceuticals

- Nutraceuticals contain **an active component found in a nutrient / food** in **much higher amounts than found in the food**, prepared in the forms of tablet, capsule or liquid and are used for treatment or prophylacy.

- They are not considered as medication.

Nurtaceuticals

- The term nutraceutical was first introduced by Stephen DeFelice in 1989 as the combination of the words **nutrition** and **pharmaceutical**.

- Nutraceuticals have protective or physiological benefits against chronic diseases, but are not considered as medicines.

- Sold in pharmaceutical dosage forms

Nutraceutical & Functional Food

- Nutraceutical and functional food are often used interchangeably.

- **Functional food:** which have health-protective, reformative and/or risk-reducing effects as well as their nutritional effects, due to one or more active ingredients, and these effects of functional foods are scientifically and clinically proven.

Functional Foods

- Natural nutrients such as;
  - Garlic,
  - Onion,
  - Tomato

  are known as functional foods due to their active components.
- Processed foods of which the active components are enriched/added or harmful components are reduced/subtracted, such as;
  - Iodized salt / sodium reduced salt
  - Omega-3-fatty acid added eggs

  are also considered as functional foods

Dietary Supplement & Nutraceutical

- The common point between dietary supplement and nutraceutical is that they are both used as nutrients.
- The main difference is that dietary supplements contain plant parts which are used as food or components obtained therefrom; while the active ingredient obtained from plants, which are consumed as food, is used at high doses in case of nutraceuticals.

Dietary Supplements

- Dietary supplements are products which comprise one or more nutritional contents such as vitamins, minerals, herbal product, amino acid, fatty acid etc. and are produced in forms of tablet, capsule or liquid.

Dietary Supplement & Nutraceutical

- The term **dietary supplement** is used in case of intake below daily required doses, to support the minimal amount which is required to be consumed to maintain the functions of the body.

- The term **nutraceutical** is used in case of intake at higher doses than daily requirement, to support or repair the body functions.

Dietary Supplement Definition of Ministry

- **Products containing nutrients such as vitamins, minerals, proteins, carbohydrates, fibers, fatty acids, amino acids and/or apart from these, concentrates and extracts of plants, plant-derived components and such substances which possess nutritional and physiologic effects alone or as mixture** and prepared in capsule, tablet, pastil, single dose powder package, liquid ampoule, dropper bottle or any other liquid of powder forms **in order to support daily diet**

	FOOD	FUNCTIONAL FOOD	DIETARY SUPPLEMENT	NUTRACEUTICAL
PHSYOLOGICAL EFFECT	+	++	++(+)	+++
PROPHYLACTIC EFFECT	+	++	++(+)	+++
THERAPEUTICAL EFFECT	-	(+)	+	++
DOSE/AMOUNT	+	+	+(+)	+++

Dietary Supplements

- Under the supervision of Ministry of Food Agriculture and Livestock
- Food supplements such as herbal products and vitamins are also sold in markets in the countries of European Union. However, the permision can be obtained even for a small proportion of nutritional products from the Ministry of Agriculture in Europe, unlike in Turkey.

Nutraceuticals

- Minerals
- Vitamins
- Enzymes
- Probiotic
- Prebiotic
- Dietary fibers
- Antioxidants
- Herbal products / Phytochemicals
- Polyansaturated fatty acids

Importance of Nutraceuticals

- Many antioxidant compounds found in vegetables, fruits and herbal teas reduce the risk of chronic disease by protecting the cells from oxidative stress.

Importance of Nutraceuticals

- Anticarcinogenic effect of various carotenoids are scientifically proven.
- Lycopene reduces the risk of cancer at prostate, breast, digestive system, skin and cervix.

Importance of Nutraceuticals

- Vegetables such as broccoli, cauliflower and cabbage reduce the risk of cancer due to the glucosinolates they contain.

Importance of Nutraceuticals

- It was determined that the rate of lung cancer decreased by 50% in patients using high amounts of flavonoids, and there was an inverse relationship between increased flavonoids consumption and the occurrence of coronary heart disease due to antioxidant and antithrombotic effects.
- It was observed that plasma total cholesterol and LDL-cholesterol levels decreased owing to flavonoid intake.

Importance of Nutraceuticals

- Cinnamic acid esters, such as caffeic acid phenylethyl and benzyl esters, exhibit antiproliferative action against some types of cancer cells.
- Phenolic and phytic acids are hyocholesterolemic and reduce the risk of breast and colon cancers.

Importance of Nutraceuticals

- Polyphenolic compounds such as catechin and tannins reduce the risk of cancer and coronary heart disease with their antioxidant properties and provide scavenging of free radicals and metals.
- Epigallocatechin in green tea is effective against various cancer types and cardiovascular diseases.

Importance of Nutraceuticals

- Phytoestrogens may act as both estrogen agonists and estrogen antagonists and may be preferred instead of estrogen in hormone replacement therapy in women.
- Thus, irregular hemorrhage, increased risk of breast and endometrial cancer which are caused by hormone therapy can be prevented.

Importance of Nutraceuticals

- Phytosterols reduce serum cholesterol levels and are found in almost all vegetables, especially in vegetable oils.
- They exhibit this effect by inhibiting the absorption of cholesterol in the intestines.
- Alpha-linoleic acid is one of the vegetable fatty acids and it reduces LDL-cholesterol level and platelet aggregation.

Nutraceuticals from Animal Origin

- Omega-3- fatty acids are especially found in fishes and effective in the treatment of hypertension, Crohn's disease and asthma.
- Reduce the risk of coronary arterial disease.
- Necessary for new tissue formation including fetal nerve tissue and neonatal brain development in fetal life.
- Reduce the severity of symptoms in rheumatoid arthritis and minimize nonsteroidal anti-inflammatory drug use.

Nutraceuticals from Animal Origin

- It is reported that omega-3-fatty acids may be benefited in case of psychiatric disorders, emotional disorders, major depression, bipolar disorder, schizophrenia and dementia encountered during and after pregnancy period.
- Lineoleic acid possesses anticarcinogenic and antiatherogenic activities.

Nutraceuticals from Animal Origin

- Prebiotics (short-chain carbohydrates such as inulin, fructose and galactooligosaccharide) serve as substrates for endogenous colon bacteria. They can provide the maintanence of the healthy state by feeding the bacteria found in the intestines and ensure gastrointestinal system to function normally.

Nutraceuticals from Animal Origin

- Probiotics are microorganisms which improve the health of the host by providing the microbial balance in the intestines .

Reliability-Usefulness

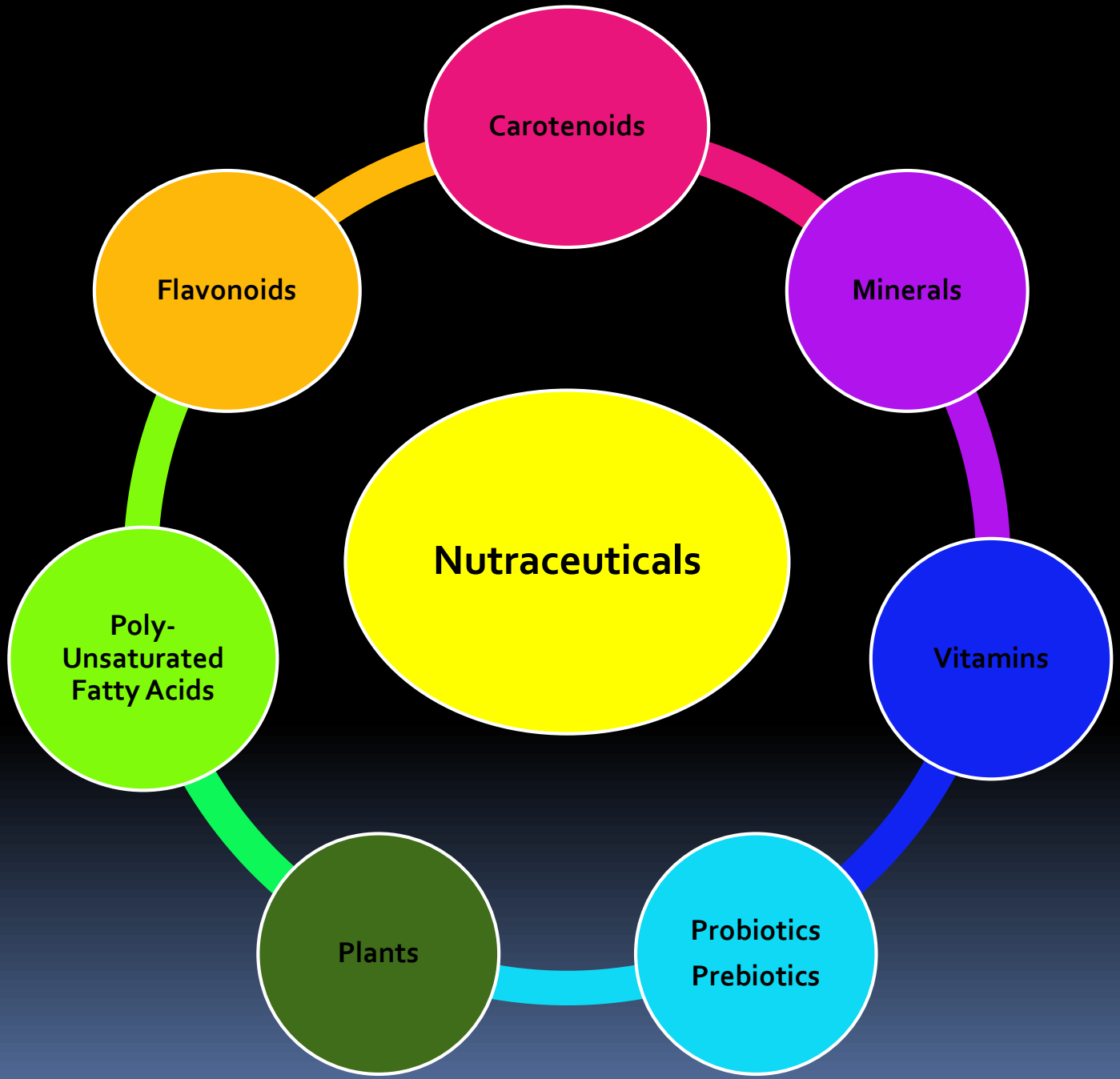
- They are generally reliable, may be used as nutrient for long periods.
- Benefits / harmful effects depend on the use at correct dose.
- Patients with chronic diseases, pregnant and lactating women, patients to undergo surgical intervention and those who use drugs prescribed for the same purpose should consult a doctor or pharmacist.

Reliability-Usefulness

- Genetic predisposition,
- Individual sensitivity,
- Drug-nutrient interactions

may be encountered.

- Unpredicted adverse effects may ocur.


Carotenoids
Minerals
Vitamins
Probiotics
Prebiotics
Plants
Poly-
Unsaturated
Fatty Acids
Flavonoids
Nutraceuticals

Classification

- Nutraceuticals may be classified according to;
  - Source nutrition
  - Activity mechanism
  - Chemical structure

Source Nutrition

- **Herbal;**
- β-glucan
- Ascorbic acid
- Quercetin
- Luteolin
- Cellulose
- Lutein
- Gallic acid
- Perillyl alcohol
- Indol-3-carbanol
- Pectin
- Daidzein
- Glutation
- Potasium
- Allicin
- Limonene
- Genistein
- Lycopen
- Hemicellulose
- Lignin
- Capsaicin
- Geraniol
- β-ionone
- β-carotene
- α-tocopherol
- Nordihydrocapsaicin
- Selenium
- Zeaxanthin

Source Nutrition

- Animal;
- Conjugated linoleic acid
- EPA (eicosapentaenoic acid)
- DHA (docosahexaenoic acid)
- Sphingolipids
- Choline
- Lecithin
- Calcium
- Coenzyme Q10
- Selenium
- Zinc

Source Nutrition

- Microbial;
- *Saccharomyces boulardii* (yeast)
- *Bifidobacterium bifidum*
- *B. longum*
- *B. infantis*
- *Lactobacillus acidophilus*
- *Streptococcus salvarius*

Activity Mechanism

- Anticancer activity;

  Capsaicin, genistein, daidzein, curcumin, ellagic acid, carnosol, lutein etc.

- Effect on blood lipid concentration;
  Quercetin, resveratol, tannin, beta sitosterol, saponins

- Antioxidant activity;

  Ascorbic acid, beta-carotene, alfa-tocopherol, lycopen, lutein etc.

- Anti-inflammatory activity;

  Linoleic acid, EPA, DHA, capsaicin, querctin, curcumin

- Bone protecting and providing bone formation;

  Genistein, daidzein, calcium etc.

Chemical structure;

- Isoprene derivatives
- Phenolic compounds
- Fatty acids and lipids
- Carbohydrates and derivatives
- Aminoacids and aminoacid-like compounds
- Microbial products
- Minerals

- **Essential Nutraceuticals;**
- Vitamins
- Minerals
- Aminoacids
- Fatty acids
- **Non-essential Nutraceuticals;**
- Carotenoids
- Phenolic compounds
- Polyunsaturated fatty acids etc.