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Next Generation Nutraceutical

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The term 'Nutraceutical' was first invented in the year 1989 by Stephen DeFelice, the founder of FIM (Foundation for Innovation in Medicine), which is now becoming a booming industry because of its functional medicinal application in prevention and treatment of diseases. After that, people from developed countries are taking interest in nutraceuticals and functional foods. However, even today, general populations from developing countries are taking interest in nutraceuticals due to their chronic disease preventive effect.

If we go back to our ancient history, the application of food materials as a folk medicine is quite a common observation. This reminds the words of the Hippocrates, who told: "let food be your medicine". The nutraceutical is a bioactive part of natural food substances, which are gradually identified and assessed by the researchers to estimate their efficacy and safety for particular disease condition and/or multiple health benefits. Usually, the food components, which are considered as nutraceutical, do not come under essential food matrix, but they are a non-food matrix, bioactive components enhance the overall health.

The reports indicate that the market for functional foods and drinks reached US\$26.4 billion in Europe and the U.S. in 2005, and due to increasing consumer acceptance, it is growing at an annual rate of 4.4 percent. Currently, China, Brazil, and India are the developing country which has become the destination of agri-based raw

material supply, whereas Europe and USA have become the nutraceuticals hubs.

Why is nutraceutical market booming?

The ancient medicinal system is based on herbal medicinal substances rather nutrient based medicine than to the chemical based medicinal system after the discovery of sulfa drug and penicillin. However, due to several reasons including slow and cost sufficient discovery process of a new molecule, reporting of adverse effects of the existing molecule, treatment-related cost burden, recession, health-related awareness and preventive measures are influenced the scientifically research on natural therapies. The research findings provide evidence that bioactive nutrients obtained from different food substances play a major role in disease prevention. Gradually, nutraceutical market is established and it has been found that Western countries, including USA, Europe, Germany and all other developed countries increase their interest to grow nutraceutical market.

In 2001, the retail sale price was \$3.9 billion in North America. In 2010, the nutraceutical market started to accelerate all over the globe. In 2010, the Nutraceutical market value reached \$ 50.4 billion in the USA, \$ 35 billion in a European country and \$ 2 billion in India.

Previously, alternative therapy or complementary medicinal treatment was limited in developing or underdeveloped countries. But gradually, the health benefits of this therapeutic management, including

the incorporation of Nutraceutical have changed the prescription pattern.

In present days, medical doctors also prescribe nutraceuticals, dietary supplements, and functional foods along with conventional medicine. Study research had also reported that one-half of adult Americans are ingesting vitamins and other dietary supplements.

A research study reported 70 percent of patients found their medical doctor as an alternative practitioner. Younger generations are very much attracted towards nutraceuticals.

The buzz of nutraceuticals is not a crazy therapeutic approach, but it indicates the necessity of nutrition in the healthcare industry to promote overall health. All the developed countries, including USA, Europe, Germany also promoted phytotherapeutics, herbal remedies etc.

Classification and definition of 'Nutraceutical'

Nutraceutical is broadly classified into two groups - dietary supplements and functional food and beverages.

Dietary supplements are a combination or a single component of dietary ingredient/s, which can prevent disease or improve health.

Functional food and beverages are conventional food or beverage items enriched with particular nutrients recommended to achieve particular health benefits, including improve compromised health condition, maintaining normal physical or mental

functioning or prevent diseases.

Each particular section of dietary supplement and Functional food and beverages are further classified into different categories.

List of Nutraceutical

There are various types of Nutraceutical available in the market, which are named under different categories:

Vitamins- There are different vitamins that are served as major Nutraceutical such as Vitamins B₁, B₂, B₆, B₁₂, folic acid, Niacin, Pantothenic acid, Vitamin A, Vitamin C, Vitamin D, Vitamin E, Vitamin K, Biotin.

Minerals- There are different minerals enlisted as major Nutraceuticals including Calcium, Zinc, Iron, Magnesium, selenium, sodium, potassium etc.

Amino acids- Amino acids are the fundamental Nutraceuticals of protein synthesis. Amino acids are linked by peptide bonds and synthesized proteins. Some peptide enzymes are essential for digestive functioning. Arginine, glutamine, lysine, leucine, isoleucine, valine are some examples of amino acids marketed as a major Nutraceuticals. Beside these amino acids, certain protein and peptide are also included in the list of major Nutraceuticals, such as Lactoferrin, Immunoglobulins, Bioactive peptides, Digestive enzymes.

PUFA- Arachidonic acid, docosahexaenoic acid, eicosapentaenoic acid, γ -linolenic acid, conjugated linoleic acid is certain popular Nutraceutical that comes under polyunsaturated fatty

acids (PUFA). Structured lipids are also available as specialty lipid supplement.

Phytochemicals—There are certain phytochemicals that considered as important Nutraceuticals due to their variety of health benefits including Phytosterols, Isoflavones, Lignans, Polyphenols, Tocotrienols, Isothiocyanates etc.

Carotenoids- Carotenoids are pigmenting substances that are found in plant-based products and marine sources including β -carotene, Lycopene, Lutien, Zeaxanthin, and Astaxanthin etc.

Fibers -Fibers are essential dietary nutrients. Some of the fibers like Inulin, Polydextrose, Beta glucan, Resistant starch, Gums such as guar gum, Pectin, Resistant maltodextrin, Psyllium, and insoluble fibers are used as nutraceuticals.

Prebiotics - Prebiotics can be defined as a non-absorbable (or non-digestible in case of food) ingredients that usefully affect the host by selectively stimulating the growth and/or activity of one or a limited number of 'friendly bacteria'. Polydextrose, Inulin, Fructooligosaccharides, Galacto-oligosaccharides, Xylooligosaccharides, soybean oligosaccharide etc. are some of the examples of prebiotics enlisted under major nutraceuticals.

Probiotics - Probiotics can be defined as a live microbial supplement which helpfully affects the host by improving the balance of 'friendly bacteria'.

Lactobacilli, Bifidobacteria, are very common nutraceuticals marketed as probiotics.

Polyols -Polyols are used as a sugar replacer. Xylitol, Lactitol, Isomalt and Maltitol are the different nutraceuticals that can be used as a sugar replacer.

Others—Some other nutraceuticals, such as Co-enzyme 10, Glucosamine, Chondroitin, Lipoic acid and Inositol have a wide range of health benefits, obtained from different natural dietary sources.

The sequence of Nutraceuticals production

A sequential production process has been followed to develop nutraceuticals in production unit o convert raw materials into finished goods.

The necessity to promote 'Next Generation Nutraceuticals'

In the present century, almost 75 percent of people are well aware of the benefits of food but only 35 percent general population are aware of the term nutraceutical. The promotion of nutraceutical research is very important for developing the market for next generation nutraceuticals. The lifestyle related morbidity, including diabetes; hypertension, hypercholesterolemia, and obesity are the key reasons for mortality in all developing countries, including India. Worldwide health associates are promoting to lead a healthy lifestyle with consumption of all the health promoting nutrients to obtain the optimum quality of life throughout the lifespan. According to the data obtained in 2010, vitamins and minerals are the most acceptable nutraceuticals, whereas fibers and

prebiotics are least desirable nutraceuticals. We need to promote the nutraceuticals as next-generation health solution for combating existing health problems, weight management, enhancing daily health, revitalize, and obtain a good future health and cosmetic purposes. Proper selection of nutraceuticals can help to provide health benefits without increasing economical, as well as side effect load to the current generation.

The promotion of nutraceuticals can also increase the economic growth of the country. In 2010, the worldwide nutraceuticals market size was \$140.1 billion. Thus, bulk revenue can be collected from the overall growth of nutraceuticals market size. In addition, the disease preventive effect of nutraceuticals can promote health and consequently healthcare spends will be reduced.

~Dr Sanjay Agrawal

Raw Material	Constituents	Finished Product	Health Benefits
Fish oil, Algae (obtained from marine sources)	Omega 3 fatty acids	Fortified foods & dietary supplements	Promotes cardiovascular functioning & cognitive health
Trimethylhydroquinone, Soybean oil (Non GMO)	Vitamin E	Dietary supplements (Single or multivitamins)	Promotes cardiovascular functioning, skin and bone health & improve cognitive health
Chemically processed ammonium salts or ammonia	Amino acids (e.g. lysine)	Fortified foods	Promote & improve cognitive health
Milk cultures (Mother culture)	Probiotics	Fortified foods & dietary supplements	Digestive health
Soybean	Soy protein	Dietary supplements	Cardiovascular Health promoting & Weight management