

Nutraceuticals: Beneficence Par Excellence

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Nutraceuticals (referred to as phytochemicals or functional foods) are natural bioactive, chemical compounds that have health promoting, disease preventing or medicinal properties. The term 'nutraceutical' was coined in 1979 by Stephen DeFelice, founder and chairman of the Foundation for Innovation in Medicine located in Cranford, New Jersey. It is defined as 'a food or part of food, which provides medical or health benefits, including the prevention and treatment of disease'. Nutraceuticals may range from isolated nutrients, herbal products, dietary supplements and diets to genetically engineered foods and processed products such as cereals, soups and beverages. With the passage of the Dietary Supplement Health and Education Act of 1994, the definition of nutraceutical has been expanded to include vitamins, minerals, herbs and other botanicals, aminoacids and any dietary substance for use by humans to supplement the diet by increasing total dietary intake. Dietary supplements have more defined health roles such as vitamins, minerals, herbs or other botanicals, amino acids, and other dietary substances intended to supplement the diet by increasing the total dietary intake of these ingredients. Many fruits, vegetables, grains, fish, dairy and meat products contain several natural components that deliver benefits beyond basic nutrition, such as lycopene in tomatoes, omega-3 fatty acids in salmon or saponins in soy.

Nutraceutical Categories

i. Dietary Supplements including botanicals

Vitamins, co-enzymes, minerals, carnitine.

Gingko bilba, Ginseng, Saint John's Wort, Saw Palmetto.

ii. Functional Foods

Oats, bran, Psyllium and lignin's for heart disease and colon cancer.

Prebiotics - Oligofructose 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.

iii. Medicinal Foods

Transgenic cows and lactoferrin for immune enhancement.

Transgenic plants for oral vaccination against infectious diseases.

Health bars with added medications.

Essential oils such as menthol from mint, thymol from thyme and eucalyptol from eucalyptus are still the basic active components for many popular mouth washes and chewing gums. Health benefits from traditional dietary ingredients are not restricted to the essential oils in herbs and spices. For example most green plants contain a compound called chlorophyll which is primarily responsible for conversion of water and carbon dioxide to energy in the plant. The compound has the added potential to trap small molecules such as those responsible for smells and for malodour and the use of chlorophyll rich plants such as parsley became popular as a way to control bad breath either as a dietary component or as the basis for a gum or mouth wash.

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Other vitamins and minerals have been shown to play a role in different aspects of oral health. For example Iron deficiency leads to the breakdown of important membranes on the tongue and linked to iron metabolism are mouth sores which arise from low vitamin b levels (particularly Niacin, Riboflavin and vitamin B₁₂). Vitamin C deficiency has long been associated with poor oral health and Scurvy, with bleeding gums and loose teeth, is perhaps the most widely known manifestation with sailors historically taking large quantities of vitamin C rich fruit and vegetables on long voyages. Recent work has indicated that Vitamin C's effects may go beyond scurvy and that low levels may also be linked with gum diseases such as Gingivitis. Whilst Magnesium has a wider metabolic role it is also associated with calcium uptake in good bone health and recent research has shown that like calcium the link extends to dental health. The general health benefits of omega -3 fatty acids are well known however interest is growing around the potential of the anti-inflammatory effects to reduce the risk of dental diseases as well as more main stream inflammation led conditions. Interestingly Omega -3, consumption is often associated with oily fish which is also known to be one of the few dietary sources of Vitamin D. Work published in 2010 from a Japanese team claimed to be the first study of its kind to look at the link between omega-3 consumption and periodontal disease. The study looked at omega-3 intakes in a group of 55 people. Dietary intake over an extended period, recorded through food diaries, was compared to dental histories. The results showed that volunteers with a high level of oily fish consumption (in particular those rich in DHA) had a significantly lower incidence of gum disease and of related teeth problems. They concluded that this was as a result of the anti-inflammatory properties of the fatty acids.

It has become evident to many dental professionals that in order to achieve enhanced, long lasting, oral wellness and longevity of dental treatment a systemic approach (nutritional support) must also be part of the patients "at home" oral care program.

A house, regardless of its magnificence, cannot stand on a faulty foundation. It is this realization that has driven the dental field towards the application of nutraceuticals as an adjunct to periodontal treatment, implant placement, and full mouth rehabilitations. In the past, periodontal disease has been treated using only a topical approach, effectively treating only the symptoms of these concerns.

However, now it has become evident that Oxidative stress, high cell turnover, and many times just poor nutrition are major issues of periodontal disease. In addition, the nutritional needs of the oral cavity increase when recovering from dental treatment; so a tested dental nutraceutical is now being recommended by dentists and hygienists for patients to take during these periods and to help maintain good oral health.

One of the "roots" of gum disease lies in poor nutritional support, leading to an overall weakened immune system. So, it is no surprise that diabetic patients and the nutritionally deficient have a 200% to 300% greater risk of developing periodontal disease. What do these risk factors have in common? They both affect the patient internally, and therefore, must be treated internally.

Before nutraceuticals, the only systemic care a patient would receive would be antibiotics targeting the release of the enzyme Collagenase. Unfortunately, the scope of antibiotics is far too narrow, and prolonged usage of antibiotics has shown to damage the immune system. Nutraceuticals are "nonantibiotics". They inhibit the release of multiple enzymes, including collagenase. They also effectively help prevent further plaque build-up, strengthen the immune system of the host and enhance soft tissue healing.

In Pharma den's double-blind Loma Linda University double blind study (the first and only study of its kind testing periodontal patients), 63 patients with 4 mm, to 7 mm, pockets were randomly selected for a 60 day assessment of the effectiveness of their supplements. The results were peer reviewed and were published in *Compendium* as far back as 2001.

The goal of this clinical trial was to measure the improvement in the patients' pocket depth, gingival index, bleeding index, and attachment level. Patients taking only two daily tablets of Pharma den's nutraceutical, Periotherapy, showed clinically significant improvements in all of these fields. The average pocket depth was reduced by 1.37 millimeters, and was achieved with no additional intervention. This shows that Periotherapy appears to offer patients a noninvasive, systemic, adjunct to treatment and for patients to use with their at-home oral hygiene regimen.

This editorial discusses nutraceuticals, especially the need for consuming appropriate diets, health issues surrounding failure to adhere to the known healthy eating models, development of new nutraceuticals/functional foods/food supplements with novel health benefits, elucidation mechanisms of action of these products. Appropriate diet culminates in a healthy, properly functioning GI tract, resulting in attainment of proper human physiology, hence healthy living; otherwise the opposite becomes true. Modelling new eating habits using the existing knowledge is needed for the eventual ideal of 'health for all' vision.

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