Nutraceuticals and their use in veterinary practice

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Introduction

Some of the most useful veterinary therapeutic aids are nutriceuticals. They are defined as non-drug substances in a purified form derived from food or a component of food and have physiological effects and therapeutic benefits. Nutraceuticals are generally very safe to use having few, if any side effects and may be used as a primary therapy or an adjunct to conventional medicines.

They often help to reduce the amount of drug necessary to manage disease conditions such as atopy, degenerative joint disease and congestive heart failure and can be of great assistance in supporting recovery and boosting vitality as well as a useful fallback for health conditions where drug use is not appropriate i.e. Drug side effects, financial constraints, etc. Nutriceuticals are usually dosed orally.

Many nutraceuticals have come to be accepted by mainstream medicine for their proven therapeutic benefits e.g. Glucosamine, Omega 3 fatty acids, anti-oxidants, SAMe (s-adenosylmethionine**,** etc. There are a many lesser known nutriceuticals which also have very useful applications in the veterinary field and may be easily integrated into general practice.

Unfortunately many supplements made for humans and animals are made according to food grade quality as opposed to pharmaceutical standard and do not actually contain what their label claims. Additionally, many products have limited bioavailability which has a substantial impact on their efficacy. Thankfully, there are some superb products available in the veterinary market today, many of which have undergone scientific trials and proven their value in case studies.

Vitamins, minerals and fatty acids often have a synergistic effect and by supplementing an animals' diet with a good quality broad spectrum supplement, providing optimal amounts of important micronutrients helps to ensure optimum health, vitality, immune status, growth, fertility, muscle and tendon strength and recovery. For convalescing animals, adding such a supplement usually assists with improved healing, increased strength and vitality, promotion of weight gain and increased appetite.

Glucosamine

Glucosamine is an amino sugar which is an important precursor in the biosynthesis of cartilage. It is a building block of proteoglycans which is one of the two main components of the cartilage matrix, the other being collagen. Proteoglycans are essential for healthy cartilage as they bind the water that lubricates and cushions the joint.

Glucosamine plays a role in regulating cartilage formation and normalizing cartilage metabolism by encouraging higher production of collagen and proteoglycans. Additionally it stimulates synovial production of hyaluronic acid, which is also responsible for joint lubrication.

All of these properties make it an invaluable aid in treating osteoarthritis, both to decrease the dose of NSAID needed as well as to slow the progression of the disease.

Various forms are available e.g. Glucosamine sulphate, N-acetyl-D- glucosamine. The latter has been shown to supplement the mucin protective layer of the internal bladder wall which protects from urinary toxins that cause stimulation of C-type pain fibres and helps to prevent occurrences of feline idiopathic cystitis.

The possibility that glucosamine products could cause insulin resistance in diabetics is very remote and would require dosages of 7-10 times the recommended dosages.

MSM (Methyl-Sulphonyl Methane)

A derivative of DMSO, has anti-inflammatory and analgesic properties, improves joint flexibility as well as elasticity of connective tissue making it a useful supplement for muscle and tendon repair.

Anti-oxidants

As part of normal metabolism free radicals are produced by oxidative stress and if not neutralized by anti-oxidants they can cause cellular damage which ultimately leads to disease. In debilitated, sick, malnourished and older animals the free radical load may be excessive as they have lower amounts of anti-oxidants available to help combat free radical damage. In conditions such as sepsis and inflammatory conditions, free radicals are produced at a greater rate which may be overwhelming and delay healing.

There are a number of well known and relatively commonly used anti-oxidants such as Vitamin C, Vitamin E, carotenoids, SAMe and those that are less well known in the veterinary field such as Coenzyme Q10 and proanthocyanidins.

Anti-oxidants work in synergy and often combination formulas are of greater general benefit than using one kind in isolation. It has been shown that inadequate availability of one anti-oxidant can result in a subsequent decrease in the bioactivity of other anti-oxidants.

Anti-oxidants have shown to provide immune support, aid in the management of dogs suffering from cognitive dysfunction, assist animals with cardiac disease (they have increased oxidative stress) and can help to improve anemia associated with renal disease.

Provided as supplementation in optimal amounts, anti-oxidants help to provide powerful general support for debilitated animals and assist with the restoration and maintenance of health.

Vitamin C (Ascorbic Acid)

Vitamin C carries dual importance as the body's premier water-soluble antioxidant and as a coenzyme essential for collagen synthesis. Vitamin C quenches free radicals, prevents lipid oxidation, and helps to regenerate other anti-oxidants. It is a co-factor for many enzyme systems involved in such functions as ATP synthesis within mitochondria and hormone biosynthesis.

Although most animals are capable of producing their own vitamin C, supplementation has benefits such as helping to retain cardiovascular health by supporting adrenal function and arterial wall integrity, assisting to protect the liver from environmental toxins and drug metabolites and to produce carnitine, interferon, and prostaglandin E1. It facilitates a healthy immune system, is involved in the intra-articular neutralization of free radicals and supporting hepatic function.

I make use of it for immune compromised animals, for joint support, to assist with detoxification and as an aid to wound healing.

Vitamin E

An important lipid soluble anti-oxidant, especially in the cellular membrane, Vitamin E provides hepatic support and it has the ability to increase blood flow and oxygen utilization. It enhances the immune response by activating anti-body forming cells. Data suggests that Vitamin E may be helpful to modulate the inflammatory phase of osteoarthritis mostly by decreasing the production of free radicals.

SAMe (s-adenosylmethionine)

An anti-oxidant with therapeutic properties assisting hepatic disorders, osteoarthritis and cognitive dysfunction. It influences cell replication, can indirectly enhance bile flow and leads to methylation of liver plasma membrane phospholipids resulting in enhanced membrane function.

SAMe is naturally synthesized and is integrally important to many hepatic functions as it increases concentrations of glutathione, a potent anti-oxidant protecting the liver from toxins and cellular death. Lower levels are common in older dogs and cats as well as those with decreased liver function so supplementation is beneficial.

SAMe is of assistance in osteoarthritis as an anti-inflammatory and also aids in the management of dogs suffering from cognitive dysfunction behavioral symptoms.

Proanthocyanidins

Proanthocyanidins are a subclass of bioflavonoids found in blue and purple berries, purple grapes, and extracts of grape-seed and pine bark (enzogenol). Research suggests a strong role for dietary bioflavonoids, including proanthocyanidins, in supporting and maintaining sound cardiovascular function.

They are powerful anti-oxidants which neutralize free radicals as well as conserve and regenerate vitamins C and E. Additionally they modulate cell-signaling pathways; regulation of the cell cycle, inhibition of cell proliferation and the production of detoxification enzymes.

Proanthocyanidins have been studied extensively and documented benefits include the support of healthy immune function, maintenance of healthy peripheral circulation and they help retain capillary strength and vascular function.

They are useful in veterinary practice for many disease conditions including osteoarthritis, infections, heart disease, saddle thrombus in cats and I have found them invaluable as a safe and reliable adjunct therapy for neurological problems, auto-immune conditions, allergies, neoplasia and simply to support vitality and general energy levels in compromised animals.

Co-Enzyme Q10

A naturally occurring anti-oxidant which assists with energy production in the mitochondrion. Cells with the highest energy demands, such as in the heart, have the highest levels of Co-enzyme Q10. With age, ability to synthesize Co-enzyme Q10 diminishes and the amount retained in tissues decreases. Amounts are also depleted by excessive exercise, illness and environmental stresses such as extreme weather.

Co-enzyme Q10 has been shown to support the heart, with no negative interactions with cardio-therapeutic drugs and no side effects or toxicity, by helping to regulate energy production of the myocardium and decrease oxidative stress on the heart.

Co-enzyme Q10 supplementation has shown improved cardiac function in animals with cardiomyopathy and congestive heart failure helping to decrease progression and improving quality of life.

Supplementation with Co-enzyme Q10 has also shown improved survival in acute renal failure, improved exercise tolerance and in some cases, been of benefit to some cats with inflammatory mouth disease.

Essential fatty acids

This group of fatty acids is considered essential because the body is incapable of producing them. Deficiencies may cause growth retardation, skin lesions, organ failure, impaired fertility and many other problems. The primary EFA's are omega 6 Linoleic Acid and its derivative Gamma Linolenic acid as well as the omega 3 Alpha-Linolenic Acid and its derivatives EPA (Eicosapentaenoic Acid) and DHA (Docosahexanoic Acid).

EFA's are important components of the cell membrane. They help to increase cellular oxygenation and therefore provide basic physiological support and play a number of vital roles in the structure and function of cellular processes in the mammalian body.

Omega-3 and omega-6 fatty acids are the biosynthetic precursors of eicosanoids (prostaglandins, thromboxanes, and leukotrienes) involved in the inflammatory pathway.

The ratio of omega 3 to omega 6 supplied in the diet is imperative to their therapeutic efficacy. If the ratio of omega 6 is too high, it shifts the inflammatory cascade in a pro-inflammatory direction leading to greater free radical production and likely cellular damage.

These fatty acids are very easily damaged by exposure to excessive heat, air and light.
In my opinion, most animals reliant on processed commercial foods to meet their dietary needs have a degree of EFA deficiency and benefit greatly from supplementation.

EFA's are helpful for flea allergic dermatitis, atopic dermatitis, food hypersensitivities, idiopathic pruritis and eosinophilic granuloma complex in cats.

Omega 3 fatty acids

These EFA's, EPA and DHA have specific anti-inflammatory properties and are a very versatile therapeutic aid for a number of health conditions.

They have been shown to significantly improve symptoms in atopic dogs and improve food intake in cachexic animals.

Omega 3's can help to reduce fatty plaques within blood vessels by reducing platelet aggregability and reducing plasma levels of triglycerides. Supplementation is associated with a reduction in cardiac arrhythmias and dogs displaying symptoms of heart failure have enhanced longevity and quality of life following omega 3 fatty acid therapy.

Supplementation helps to maintain normal kidney function by ensuring effective glomerular filtration and can help preserve renal structure in both humans and animals. These effects together with their anti-inflammatory properties all contribute to slower disease progression of renal failure.

EPA is the only fatty acid that is significantly incorporated into the canine chondrocyte and is able to down regulate aggrecanase, the principal enzyme responsible for the degradation of canine joint cartilage. This makes it a useful supplement for animals with osteoarthritis.

DHA is one of the dominant fats in the nerve cells of fetal and infant brains, and research shows that omega-3 fatty acids are critical to the development of the brain before birth and during early development. Supplementation helps to promote optimal neural development and function.

B-Vitamin Complex

Vitamin B's are fundamental to energy production, metabolism, growth, and maintenance of healthy tissues. They are a useful aid in helping to reduce nervousness and general stress, treating muscle fatigue, supporting appetite as well as treating debility, anorexia and anemia.

Glutamine

An amino acid supporting the immune system and providing nourishment for epithelial enterocytes. A very useful therapeutic aid for compromise of the GIT ie. Post parvo-virus, enteritis.

Milk Thistle

Has been used as a natural remedy to support liver health for more than 2000 years. As an antioxidant, milk thistle helps to increase the amount and the activity of several antioxidant enzyme systems that are involved in the detoxification process, such as superoxide dismutase (SOD) and the glutathione peroxidase system.

The active phytochemicals in milk thistle may also stimulate protein synthesis in liver cells, which helps to regenerate them and promote hepatic health.

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