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Antioxidants are nature's answer to inflammation.

By Dr. Karen Shaw Becker

Free radicals cause damage called oxidative stress in your dog's body, and oxidative stress and the inflammation it causes are directly linked to aging and disease.

Free radicals occur naturally as the result of metabolic, cellular and immune system functioning, as well as certain external factors.

Antioxidants neutralize free radicals before they do harm, which is why it's so important to offer your dog a nutritionally balanced fresh food diet rich in antioxidants.

Other excellent sources of antioxidants including;

Aastaxanthin.

Moringa

Alpha-lipoid acid (ALA).

Free radicals are unstable molecules that travel around the body looking for opportunities to bond with stable molecules to steal an electron and stabilize themselves.

When they're successful, they create new unstable molecules, and the cycle begins again.

Free radicals are unavoidable because they're produced during normal metabolic, cellular and immune system activity, as well as by external factors such as vigorous exercise, a less-than-optimal diet, stress, pollution — even sunlight.

Free radicals cause altered gene expression and damage to cell membranes, leading to oxidative stress and [inflammation](#), which is associated with aging and disease.

However, the good news is that nature provides a very powerful weapon against this degenerative process:

Antioxidants.

Antioxidants counteract the effects of free radicals

Antioxidants help to protect the heart, brain and other organs from oxidative stress.

Antioxidants benefit the health and longevity of dogs.

Antioxidants are beneficial molecules that neutralize the toxic free radicals floating around in your dog's body before they can harm healthy cells and tissue, thereby reducing oxidative stress and DNA damage.

Antioxidants play a key role in longevity, and high levels of circulating antioxidants are commonly seen in the "oldest old" among us.

Several studies of older dogs have proved the benefits of an antioxidant-rich diet for the [aging canine brain](#).^{1,2,3,4}

The results of a seven-year study of 90 kitties aged 7 to 17 who were fed an antioxidant-rich diet showed fewer decreases in lean muscle

mass; improved body weight, lean body mass, skin thickness and red cell quality; decreased incidence of disease; general improvement in quality of life; and significantly longer life span.⁵

The same is true for dogs. The more free radicals the body makes, the more antioxidants the body requires, and research shows [puppies may have antioxidant deficiencies](#).

Most commercially available pet foods, even high-quality formulas, contain synthetic vitamins and minerals that provide minimal nutrition, not optimum nutrition.

My good friend and fellow pet food formulator, Steve Brown created the following chart to demonstrate the differences between nutrients in the diet dogs **used to eat (their ancestral diet)** versus what's considered "acceptable" (AAFCO minimum nutrient requirements) now:

	AAFCO	Ancestral
Calcium (g)	1.25	5.7
Phosphorus (g)	1.0	3.3
Potassium (g)	1.5	2.0
Sodium (g)	0.2	1.0
Magnesium (g)	0.15	0.4
Iron (mg)	10	43
Copper (mg)	1.8	6.0
Manganese (mg)	1.3	3.1
Zinc (mg)	20	24
Vitamin E (IU)	12.5	23

As the chart makes all too clear, AAFCO recommendations may sustain life, but they certainly don't nourish animals in the way nature intended.

Whole food sources of antioxidants.

Your dog's body is designed to absorb nutrients from [fresh, living foods](#) very efficiently.

Antioxidants are contained in the vitamins in fresh foods, including:
Vitamin A and carotenoids, which are found in liver and bright-colored fruits and veggies like apricots, broccoli, cantaloupe, carrots, peaches, squash, sweet potatoes and tomatoes.

Vitamin C, found in citrus fruits and strawberries, as well as green peppers, broccoli and green leafy vegetables.

Vitamin E, found in nuts and seeds.

Selenium, found in protein sources like nuts, fish, chicken, beef and eggs.

Phytochemicals also contain antioxidant properties:

Flavonoids/polyphenols are in berries and tea (decaffeinated, for dogs).

Lycopene is in tomatoes and watermelon.

Lutein sources are dark green vegetables like spinach, broccoli and kale

Lignan is found in seeds.

Additional excellent sources of antioxidants.

- **Astaxanthin:** [Astaxanthin](#) is a naturally occurring, nontoxic, whole food source of vitamin A found in wild sockeye salmon, red trout, shrimp, crab and algae that is hundreds of times more potent than vitamin E, ten times more potent than beta-carotene and about five times more potent than lutein as a functional antioxidant.

Astaxanthin fights oxidative stress and free radical damage.

It has very strong free radical scavenging abilities and helps protect cells, organs and tissues from oxidative damage.

Astaxanthin provides antioxidants to parts of the body that don't normally receive a lot of antioxidant benefit.

It can cross the blood-brain barrier and the blood-retina barrier.

This means it can help reduce the potential for diseases of the central nervous system, the spinal cord and the eye.

Astaxanthin also supports immune function thanks to its high levels of beta-carotene.

Studies also show astaxanthin supports joint and muscle recovery after exercise, and cardiovascular health in dogs and cats.

A study of Beagles concluded that supplementation with astaxanthin improves mitochondrial function in dogs.⁶

The study involved both young and geriatric healthy female Beagles.

The dogs were fed 20 mgs of astaxanthin daily for 16 weeks.

Fasting blood samples were taken at the start of the study, again at eight weeks and again at completion of the trial.

Mitochondrial function improved in both the young and elderly Beagles. In the older dogs, astaxanthin supplementation increased ATP production, mitochondria mass and cytochrome c oxidoreductase activity.

In the young dogs, astaxanthin increased the reduced glutathione to oxidized glutathione ratio. It decreased nitric oxide in all the dogs.

- **Moringa:** Moringa oleifera is a fast-growing tree native to South Asia and now found throughout the tropics.

Its leaves have been used as part of traditional medicine for centuries, and the Ayurvedic system of medicine associates it with the cure or prevention of about 300 diseases.⁷

[Moringa leaves](#) are loaded with vitamins, minerals and essential amino acids. They're also rich in [antioxidants](#), including vitamin C, beta-carotene, quercetin and chlorogenic acid.

The latter, chlorogenic acid, has been shown to slow cells' absorption of sugar, and animal studies have found it to lower blood sugar levels.

[According to the Asian Pacific Journal of Cancer Prevention:](#)

*"The leaves of the Moringa oleifera tree have been reported to demonstrate antioxidant activity due to its high amount of polyphenols. Moringa oleifera extracts of both mature and tender leaves exhibit strong antioxidant activity against free radicals, prevent oxidative damage to major biomolecules, and give significant protection against oxidative damage."*⁸

Because the body views moringa as food, I've found this herb to be exceptionally beneficial for sensitive patients who can't tolerate other supplements, and have given it to very old hyperthyroid cats and diabetic ferrets, and have mixed it in a hand feeding formula for neonatal parrots.

- **Alpha-Lipoic Acid:** Alpha-lipoic acid (ALA), also known as α -lipoic acid, lipoic acid (LA) and thioctic acid, is an organosulfur compound derived from octanoic acid.

It's important not to confuse alpha-lipoic acid with the [omega-3 essential fatty acid](#) alpha-linolenic acid, especially since both are often abbreviated as ALA.

Alpha-lipoic acid is a naturally occurring antioxidant found in every cell of the body, where its job is to turn glucose into energy.

While other antioxidants work only in water (e.g., vitamin C) or only in fatty tissue (e.g., vitamin E),

alpha-lipoic acid is considered a "universal" antioxidant because it's both water- and fat-soluble.

This means it works throughout the body to provide protection to all the cells and organ systems, including the brain, because it also crosses the blood-brain barrier.

Antioxidants are used up as they attack free radicals, but there is evidence that ALA may actually help regenerate other antioxidants and make them active again.

Foods containing the highest amounts of [alpha-lipoic acid](#) include; Spinach, cow kidneys and hearts, and broccoli.

ALA does come in supplement form, but it's very important to work with a [holistic veterinarian](#) or other knowledgeable source on proper dosing, and focus on food sources first.

Alpha-lipoic acid supplements can be toxic to pets if overdosed, so sticking to food sources is always safe, or work with an integrative vet on the correct dose, if supplementing.⁹