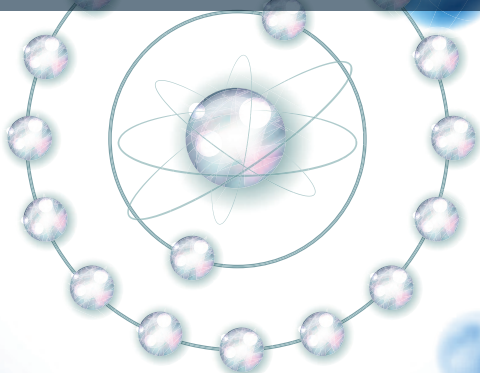


HOT TOPIC

Antioxidants in pet food



In focus

Dietary antioxidants support pet health and help preserve the nutritional quality of pet food. Learn more about the important ways that antioxidants contribute to better, longer lives for pets.

The Purina Institute provides the scientific facts to support your nutritional conversations.

let's
takeback
the conversation.

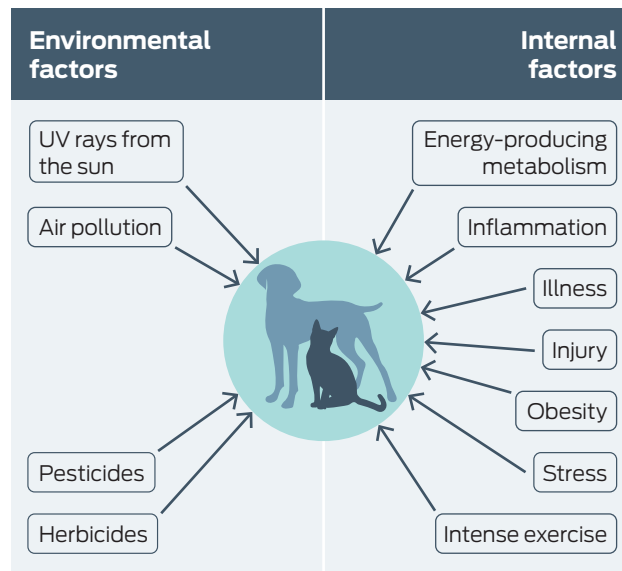
Learn more about the power of nutrition at
PurinaInstitute.com

What are antioxidants?

An antioxidant is any compound – vitamin, mineral, or enzyme – that helps protect against damage from reactive oxygen species (ROS).¹

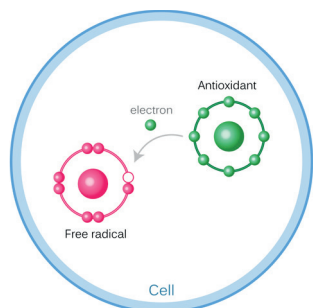
ROS (sometimes called free radicals) are reactive molecules that can cause oxidative damage to cell membranes, proteins, or DNA, with potential cell or tissue injury.²

Where do ROS come from?



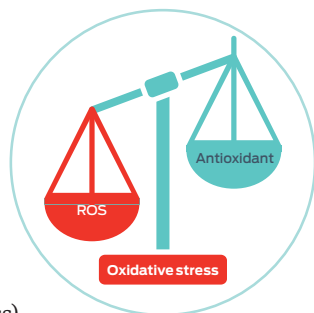
Antioxidants can work in several ways^{3,4}

- Antioxidants (such as vitamins C & E) may donate an electron to an unstable ROS, transforming it into a non-reactive molecule – a process called “scavenging”
- Some inhibit ROS from forming
- Other nutrients, such as zinc, manganese, iron, selenium, and copper, are important components of antioxidant enzyme systems that help scavenge ROS



How do dietary antioxidants benefit cat and dog health?

In health, the body produces many of its own antioxidants, and there is a balance between the body’s antioxidants, ROS production, and cell protection. But aging, exercise, stress, and disease can lead to increased ROS production, decreased antioxidants, and a potentially harmful imbalance (oxidative stress).



Oxidative stress contributes to the development of many health conditions such as decreased immunity, cognitive decline, arthritis, or vision loss.²⁻⁴

Studies show that antioxidant supplementation can support pet health in many ways. For example:

- Older dogs or cats fed diets supplemented with antioxidants were more successful at specific complex learning tasks than those fed diets without antioxidants, and older dogs showed fewer age-related behavioral changes, suggesting that antioxidants may help slow aging changes in the brain.⁵⁻⁸
- Immune cell (lymphocyte) response improved in adult cats after vitamin E supplementation.⁹
- When supplemented with antioxidants (vitamins C & E, beta-carotene and selenium) puppies undergoing a standard vaccination protocol with a combination canine parvovirus and distemper vaccine showed significantly increased titers and immune memory cells compared to the control groups.¹⁰
- Eye health in healthy dogs improved after 6-months of supplementation with an antioxidant blend (lutein, zeaxanthin, β -carotene, astaxanthin, vitamin C, and vitamin E), as measured by retinal response to light and improved refractive error – the blurring of vision caused by changing eye shape or aging lenses.¹¹

How do antioxidants protect pet food?

Over time, exposure to oxygen breaks down the fats, oils, and other nutrients in foods, leading to rancidity, odors, and poor taste quality.

Antioxidants can slow the rate of, or prevent, oxidation damage to protect food from deterioration (extend shelf life) and maintain the palatability, nutritional quality and safety of food.¹²

For decades, both natural and synthetic (man-made) antioxidants have been safely used to help preserve both pet and human foods.

- Vitamin C (ascorbic acid) and vitamin E (alpha-tocopherol or mixed-tocopherols) may be the best recognized natural antioxidants, but there are many others including antioxidants extracted from herbs, such as rosemary and sage.¹³
- Common synthetic antioxidants, such as butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT), have long been approved for use in foods, including human and pet foods, and are safe when used in approved amounts.¹⁴

References

- Li, R., Jia, Z., & Trush, M. A. (2016). Defining ROS in Biology and Medicine. *Reactive Oxygen Species (Apex, N.C.)*, 1(1), 9–21.
- McMichael M. A. (2007). Oxidative stress, antioxidants, and assessment of oxidative stress in dogs and cats. *Journal of the American Veterinary Medical Association*, 231(5), 714–720.
- Pisoschi, A. M., Pop, A., Iordache, F., Stanca, L., Predoi, G., & Serban, A. I. (2020). Oxidative stress mitigation by antioxidants - An overview on their chemistry and influences on health status. *European Journal of Medicinal Chemistry*, 209, 112891. Advance online publication.
- Willcox, J. K., Ash, S. L., & Catignani, G. L. (2004). Antioxidants and prevention of chronic disease. *Critical Reviews in Food Science and Nutrition*, 44(4), 275–295.
- Cotman, C. W., Head, E., Muggenburg, B. A., Zicker, S., & Milgram, N. W. (2002). Brain aging in the canine: a diet enriched in antioxidants reduces cognitive dysfunction. *Neurobiology of Aging*, 23(5), 809–818.
- Milgram, N. W., Head, E., Muggenburg, B., Holowachuk, D., Murphey, H., Estrada, J., Ikeda-Douglas, C. J., Zicker, S. C., & Cotman, C. W. (2002). Landmark discrimination learning in the dog: effects of age, an antioxidant fortified food, and cognitive strategy. *Neuroscience and Biobehavioral Reviews*, 26(6), 679–695.
- Pan, Y., Araujo, J. A., Burrows, J., de Rivera, C., Gore, A., Bhatnagar, S., & Milgram, N. W. (2013). Cognitive enhancement in middle-aged and old cats with dietary supplementation with a nutrient blend containing fish oil, B vitamins, antioxidants and arginine. *British Journal of Nutrition*, 110, 40–49.
- Pan, Y., Kennedy, A. D., Jonsson, T. J., & Milgram, N. W. (2018). Cognitive enhancement in old dogs from dietary supplementation with a nutrient blend containing arginine, antioxidants, B vitamins and fish oil. *British Journal of Nutrition*, 119, 349–358.
- O'Brien, T., Thomas, D. G., Morel, P. C., & Rutherford-Markwick, K. J. (2015). Moderate dietary supplementation with vitamin E enhances lymphocyte functionality in the adult cat. *Research in Veterinary Science*, 99, 63–69.
- Khoo, C., Cunnick, J., Friesen, K., Gross, K. L., Wedekind, K., & Jewell, D. E. (2005). The role of supplementary dietary antioxidants on immune response in puppies. *Veterinary Therapeutics: Research in Applied Veterinary Medicine*, 6(1), 43–56.
- Wang, W., Hernandez, J., Moore, C., Jackson, J., & Narfström, K. (2016). Antioxidant supplementation increases retinal responses and decreases refractive error changes in dogs. *Journal of Nutritional Science*, 5, e18.
- Hosseini, H., & Jafari, S. M. (2020). Introducing nano/microencapsulated bioactive ingredients for extending the shelf-life of food products. *Advances in Colloid and Interface Science*, 282, 102210. <https://doi.org/10.1016/j.cis.2020.102210>
- Berdahl, D.B., & McKeague, J. (2015) Rosemary and sage extracts as antioxidants for food preservation. Shahidi, F. (Ed.), *Handbook of Antioxidants For Food Preservation*, 276, Woodhead Publishing, Cambridge, UK. pp. 177–217.
- <https://www.fda.gov/food/food-additives-petitions/food-additive-status-list>