Total antioxidant power in sled dogs supplemented with blueberries and the comparison of blood parameters associated with exercise

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Abstract

Oxidative damage from free radicals plays an important role in several diseases such as cancer, Alzheimer’s disease, and heart disease. Research indicates that exercise contributes to oxidative stress. Fruits, such as blueberries, are good antioxidants because they contain phenolics that preferentially react with free radicals. Maintaining antioxidant levels by supplementing the diet with blueberries may prevent exercise-induced oxidative damage. The goal of our study was to compare antioxidant levels in sled dogs supplemented with blueberries on blood parameters within 48 h post-exercise. Though the exercise protocol did not cause unusual muscle damage as reflected in plasma creatine kinase and isoprostane levels, blueberry supplementation did elicit significantly elevated antioxidant status in sled dogs post exercise. This suggests that dogs fed blueberries while exercising as compared to dogs fed a control diet while exercising, may be better protected against oxidative damage.

Polyphenols: antioxidants and beyond
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Abstract

Research on the effects of dietary polyphenols on human health has developed considerably in the past 10 y. It strongly supports a role for polyphenols in the prevention of degenerative diseases, particularly cardiovascular diseases and cancers. The antioxidant properties of polyphenols have been widely studied, but it has become clear that the mechanisms of action of polyphenols go beyond the modulation of oxidative stress. This supplemental issue of The American Journal of Clinical Nutrition, published on the occasion of the 1st International Conference on Polyphenols and Health, offers an overview of the experimental, clinical, and epidemiologic evidence of the effects of polyphenols on health.
Brain aging in the canine: a diet enriched in antioxidants reduces cognitive dysfunction

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Abstract

Animal models that simulate various aspects of human brain aging are an essential step in the development of interventions to manage cognitive dysfunction in the elderly. Over the past several years we have been studying cognition and neuropathology in the aged-canine (dog). Like humans, canines naturally accumulate deposits of β-amyloid (Aβ) in the brain with age. Further, canines and humans share the same Aβ sequence and also first show deposits of the longer Aβ1–42 species followed by the deposition of Aβ1–40. Aged canines like humans also show increased oxidative damage. As a function of age, canines show impaired learning and memory on tasks similar to those used in aged primates and humans. The extent of Aβ deposition correlates with the severity of cognitive dysfunction in canines. To test the hypothesis that a cascade of mechanisms centered on oxidative damage and Aβ results in cognitive dysfunction we have evaluated the cognitive effects of an antioxidant diet in aged canines. The diet resulted in a significant improvement in the ability of aged but not young animals to acquire progressively more difficult learning tasks (e.g. oddity discrimination learning). The canine represent a higher animal model to study the earliest declines in the cognitive continuum that includes age associated memory impairments (AAMI) and mild cognitive impairment (MCI) observed in human aging. Thus, studies in the canine model suggest that oxidative damage impairs cognitive function and that antioxidant treatment can result in significant improvements, supporting the need for further human studies.
Regulation of inflammation and redox signaling by dietary polyphenols

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Abstract

Reactive oxygen species (ROS) play a key role in enhancing the inflammation through the activation of NF-κB and AP-1 transcription factors, and nuclear histone acetylation and deacetylation in various inflammatory diseases. Such undesired effects of oxidative stress have been found to be controlled by the antioxidant and/or anti-inflammatory effects of dietary polyphenols such as curcumin (diferuloylmethane, a principal component of turmeric) and resveratrol (a flavanoid found in red wine). The phenolic compounds in fruits, vegetables, tea and wine are mostly derivatives, and/or isomers of flavones, isoflavones, flavonols, catechins, tocopherols, and phenolic acids. Polyphenols modulate important cellular signaling processes such as cellular growth, differentiation and host of other cellular features. In addition, they modulate NF-κB activation, chromatin structure, glutathione biosynthesis, nuclear redox factor (Nrf2) activation, scavenge effect of ROS directly or via glutathione peroxidase activity and as a consequence regulate inflammatory genes in macrophages and lung epithelial cells. However, recent data suggest that dietary polyphenols can work as modifiers of signal transduction pathways to elicit their beneficial effects. The effects of polyphenols however, have been reported to be more pronounced in vitro using high concentrations which are not physiological in vivo. This commentary discusses the recent data on dietary polyphenols in the control of signaling and inflammation particularly during oxidative stress, their metabolism and bioavailability.


Relationship between polyphenol content and anti-influenza viral effects of berries.

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Source

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Abstract

BACKGROUND:
Berries are known to have many kinds of biological activities. We focused on their antiviral effect, which has not yet been well evaluated.

RESULTS:
We compared the anti-influenza viral effects of berries belonging to the genus Vaccinium - 35 species of blueberry (Vaccinium cyanococcus), the Natsuhaze (Vaccinium oldhamii), bilberry (Vaccinium myrtillus) and cranberry (Vaccinium oxyccoccs) - with those belonging to the genus Ribes, i.e. blackcurrant (Ribes nigrum). Only Elliott and Legacy among Northern Highbush varieties but many Rabbiteye varieties such as Austin, Baldwin, Brightblue, Festival, T-100 and Tifblue showed anti-influenza viral activity. Natsuhaze, bilberry, cranberry and blackcurrant had high antiviral effects. A relationship was observed between the antiviral effect and total polyphenol content.

CONCLUSIONS:
Antiviral effects were found to differ markedly between berry species. Rabbiteye varieties tended to have higher antiviral effects than Northern, Southern and Half Highbush blueberry varieties. We also found that Natsuhaze, which has recently been harvested in Japan as a potential functional food, had an antiviral effect comparable to that of bilberry, cranberry and blackcurrant. There was a positive relationship between antiviral activity and polyphenol content, indicating the possibility that polyphenol is one of the key factors in the antiviral effects of berries.
Dietary antioxidants and behavioral enrichment enhance neutrophil phagocytosis in geriatric Beagles

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Abstract

The study objective was to determine the effects of feeding food enriched in antioxidants and a program of environmental/cognitive enrichment on selected ex vivo assays of inflammatory and immune cells in healthy geriatric Beagle dogs (n = 21). Four groups of dogs were tested using a 2 × 2 factorial design. The 2-year longitudinal study included both nutritional (control food or antioxidant-fortified food) and behavioral (normal level or cognitive enrichment) interventions. Behavior enrichment included increased exercise, environmental enrichment, and a series of learning tasks. Phagocytosis of opsonized latex-coated beads by peripheral blood neutrophils was measured by flow cytometry and found to be significantly increased in dogs receiving both dietary antioxidants and cognitive enrichment. Simultaneous stimulation of cells with Con A and suppression with Dex resulted in decreased lymphocyte proliferation in dogs receiving both dietary antioxidants and cognitive enrichment, compared to dogs receiving dietary antioxidants or cognitive enrichment alone. There were no significant differences between the groups of dogs for percentages of CD4 and CD8 T-lymphocyte subpopulations before or after lymphocyte stimulation with Con A. These results support our hypothesis that both dietary antioxidants and behavioral enrichment enhance host defense mechanisms.

Oxidative Stress and Chronic Kidney Disease

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Slowing the rate of progression of chronic kidney disease (CKD) is a critical part of the management of affected dogs and cats. Renal oxidant stress is a previously unrecognized factor in the progression of canine CKD and is likely to be similarly important in feline CKD. Renin-angiotensin antagonism, calcium channel antagonism, n-3 polyunsaturated fatty acid, and antihypertensive and antiproteinuric therapy are commonly recommended for dogs and cats with CKD. These therapies would be expected to reduce renal oxidant stress by decreasing reactive oxygen species generation. Newer data indicate that dietary supplementation with specific antioxidants is an important consideration for limiting renal oxidant stress and progression of CKD.