

Oxidative stress and the paradoxical effects of antioxidants

Sir,

Oxidative stress is referred to imbalance between the reactive oxygen species and antioxidants system to detoxify the reactive intermediates or to repair the resulting damage.^[1-3] Oxidation is a chemical reaction that transfers electrons or hydrogen from a substance to an oxidizing agent.^[4-6] Although oxidation reactions are crucial for life, they can also be damaging.^[1,2,7-9] Insufficient levels of antioxidants or inhibition of the antioxidant enzymes, cause oxidative stress which may damage all components of the cell, including proteins, lipids and deoxyribonucleic acid.^[1] The oxidative stress is thought to be involved in the development of atherosclerosis, heart failure, myocardial infarction, cancer, Parkinson's disease, Alzheimer's disease, sickle cell disease, lichen planus, vitiligo, autism, chronic fatigue syndrome and renal failure.^[1,2,6,10-14] Antioxidants are reducing agents such as thiols, ascorbic acid, or polyphenols molecules that inhibit the oxidation of other molecules by being oxidized themselves. Plants and animals maintain complex systems of multiple types of antioxidants such as glutathione, vitamin C, vitamin A and vitamin E as well as enzymes such as catalase, superoxide dismutase and various peroxidases.^[1,2,6,13] Antioxidants are widely used in dietary supplements and have been investigated for the prevention of diseases such as cancer, coronary heart disease and even altitude sickness. Although initial studies suggested that antioxidant supplements might promote health, later large clinical trials with a limited number of antioxidants detected no benefit and even suggested that excess supplementation with certain putative antioxidants may be harmful.^[11,14] From the literature review we may conclude that the diets high in antioxidants (fruits and vegetables) are nearly almost beneficial, but this is not the case for diet supplementations. The possible explanation is that, in the diet, there is a mix of antioxidants and it is well recognized that they work as a continuous chain, while supplementation is usually given using one or two substances. Therefore, the antioxidant chain is not completely available.^[1,2,6,13] In this regard, it is well-known that after scavenging free radicals, if an antioxidant is not restored by the following antioxidant in the chain, it begins to be a pro-oxidant. In this situation, the final effect of such supplementations would be no effect or a damaging effect.^[14,15] Therefore, in antioxidant therapy complimentary antioxidants cannot always substitute the fruits and vegetables high in antioxidants.

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