



## Positive effect of antioxidants on immune system

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**Received:** 5 October 2014

**Accepted:** 7 November 2014

**ePublished:** 17 November 2014

**Keywords:** Immune system,  
Free radical, Antioxidants

**Citation:** Hajian S. Positive effect of antioxidants on immune system. *Immunopathol Persa.* 2015;1(1):e02.



### Key point

Free radicals are produced during normal cellular metabolism and consequence from the metabolism of definite medicines or xenobiotics. Oxidative stress is a major contributing aspect to the high mortality rates associated with dysregulation of immune and lead to several diseases and the immune system is mainly sensitive to oxidative stress. An adequate intake of vitamins and antioxidant can notably improve confident immune system.

The body is normally under a dynamic balance between free radical generation and quenching. If the balance between free radical production and antioxidant defenses diminished, immune cells have an adverse effect on functions of body and suffer a senescent corrosion almost certainly linked to oxygen stress. Free radicals are produced during normal cellular metabolism and consequence from the metabolism of definite medicines or xenobiotics (1,2). The harmful activities of free radicals are correlated with damage to membranes, DNA, and enzymes. Oxidative stress is a major contributing aspect to the high mortality rates associated with dysregulation of immune and leads to several diseases and the immune system is mainly sensitive to oxidative stress. Autoimmune disease such as rheumatoid arthritis increased activity of leucocytes and fibroblasts that create reactive oxygen species (ROS) and antioxidants have been successfully used as adjuvant therapy in autoimmune disease. During the functioning of the immune system reactive oxygen and nitrogen species are created. Immune cells use ROS in order to keep up their functions and therefore need adequate levels of antioxidant defenses sequentially to avoid the harmful effect of an excessive production of ROS (3-5). Reactive oxygen metabolites, activated monocytes and neutrophils emit the hemoprotein myeloperoxidase into the extracellular space, where it catalyzes the oxidation of Cl<sup>-</sup> by Hydrogen peroxide to produce hypochlorous acid which is a non-specific oxidizing and chlorinating agent that reacts quickly with a kind of biological compounds, such as polyunsaturated fatty

acids and DNA (6). Additionally, apart from their direct toxic effects, neutrophil derived oxidants may raise tissue injury indirectly by changing the protease-antiprotease equilibrium that usually exists in the intestinal interstitium. The oxidative inactivation of key protease inhibitors, paired to the oxidant mediated activation of concealed proteases, creates a favorable situation for neutrophils that allows degradation of the interstitial matrix throughout elastases, gelatinases and collagenases, as well as injury to epithelial cells. Comparing with other somatic cells, immune cells contain high levels of antioxidant vitamins due to their high polyunsaturated fatty acids content and sensitive to external ROS, which are probably providing protection versus lipid peroxidation and immunosuppression, both of which are well known risks posed by high polyunsaturated fatty acids content (7). Natural compounds from medicinal plants having antioxidant and immune modulatory activities so dietary supplementation with antioxidants can help in such situation. An antioxidant nutrients have been improved immune function in elderly and young people. The ability of antioxidants to demolish free radicals protects the structural integrity of cells and tissues. Latest clinical trials have found that antioxidant supplementation can notably improve confident immune reactions (8,9). Supplementation with the antioxidant vitamins same as vitamins C, E, and A or beta carotene protected immune responses in individuals exposed to definite environmental sources of free radicals (10). In addition these vitamins and selenium have an antioxidant effect due to their ability to

transform ROS into constant and harmless compounds or by scavenging both ROS and reactive nitrogen species (RNS) with a redox based mechanism. When the balance between ROS/RNS and antioxidants turns in accord of the former, oxidative/nitrosative stress occurs. An adequate intake of vitamins and antioxidant elements are an essential for an efficient function of the immune system cause of control of immune function affecting both innate T cell mediated immune reply and adaptive antibody reply, as a consequence altering the balanced host response (11,12). Supplement of vitamin E increased antibody titer to both tetanus and hepatitis B vaccine, thus enhancing T cell mediated functions. Also vitamin suppresses Fas and Fas ligand mRNA expression and protects T cells of HIV type 1 infected individuals from Fas mediated apoptosis (13,14). An administration of the antioxidant N-acetyl cysteine induced a reduction in mast cell expression of both immunoglobulin E and interleukin 4. This concluding has been shown to have immune restorative properties because it affects the type 1 T helper (Th1)/type 2 T helper (Th2) system by inhibiting the Th2 response. Nutritional antioxidants, in particular polyphenols, has been shown to increase antioxidant enzymes such as HO-1 expression in different in vitro systems and the potential make use of this natural substances to regulate immune response should be carefully referred. Curiously, another quinone compound and carnosic acid recovers potent antioxidant activity upon standing. Many researchers have argued that vitamins increased the activation of cells implicated in tumor immunity in the elderly. In addition the effect of vitamin A is decreasing morbidity and mortality associated with measles infections in children (13-16).

### Conclusion

Antioxidants preserve an ample function of immune cells against homeostatic disturbances caused by oxidative stress. Therefore, since the immune system is an indicator of health and a longevity analyst, the protection of this system afforded by dietary antioxidant. In conclusion, antioxidant vitamins and trace elements have important effects on immune responses.

### Author's contribution

SH was the single author of the paper.

### Conflicts of interest

The author declared no competing interests.

### Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the author.

### Funding/Support

None.

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