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Review Article

Anti oxidants

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Abstract

Most of the human diseases are due to anti - oxidant deficiency or imbalance in the body. In the twenty-first century, knowledge about anti – oxidant is very essential and it is almost impossible to ignore. Anti - oxidant. Modern medical science development without the knowledge or some ideas about free radical cannot beaccepted. So it is impossible to improve the medical science without the sufficient knowledge of anti-oxidants. Oxidative stress appears to be an important part of many human diseases, the use of antioxidants in pharmacology is ntensively studied, particularly as treatments for stroke and neurodegenerative diseases and age related macular degeneration.

Antioxidants are frequently added to industrial products. A common use is as stabilizers in fuels and lubricants to prevent oxidation, and in gasolines to prevent the polymerization that leads to the formation of engine-fouling residues.

They are widely used to prevent the oxidative degradation of polymers such as rubbers, plastics and adhesives that causes a loss of strength and flexibility in these materials.

Introduction

Before going to know something about anti-oxidants it is essential primarily to acquire some knowledge about free radicals or free ions. Antioxidant is a molecule capable of inhibiting the oxidation of other molecules. Oxidation is a chemical reaction that transfers electrons or hydrogen from a substance to an oxidizing agent. Oxidation reactions can produce free radicals. In turn, these radicals can start chain reactions. When the chain reaction occurs in a cell, it can cause damage or death to the cell. Antioxidants terminate these chain reactions by removing free radical intermediates, and inhibit other oxidation reactions. They do this by being oxidized themselves, so antioxidants are often reducing agents such as thiols, ascorbic acid, or polyphenols such as glutathione, vitaminC,and vitamin E as well as enzymes such as catalase, superoxide dismutase and various peroxidases.

Low levels of antioxidants,or inhibition of the antioxidant enzymes, cause oxidative stress and may damage or kill cells.As oxidative stress appears to be an important part of many human diseases, the use of antioxidants in pharmacology is intensively studied, particularly as treatments for stroke and neurodegenerative diseases.

Antioxidants are widely used as ingredients in dietary supplements and have been investigated for the prevention of diseases such as cancer, coronary heart disease, early onset macular degeneration and even altitude sickness. Although initial studies suggested that antioxidant supplements might promote health, later large clinical trials did not detect any benefit and suggested instead that excess supplementation is harmful.

Oxidation is a chemical reaction that transfers electrons or hydrogen from a substance to an oxidizing agent. Oxidation reactions can produce free radicals. In turn, these radicals can start chain reactions. When the chain reaction occurs in a cell, it can cause damage or death to the cell. Antioxidants terminate these chain reactions by removing free radical intermediates.

Although ,oxidation reactions are crucial for life, hence, plants and animals maintain complex systems of multiple types of antioxidants, such as glutathione, vitamin C, and vitamin E .

Observation and results

A The reactive oxygen species produced in cells include hydrogen peroxide (H_2O_2),hypochlorous acid (HClO), and free radicals such as the hydroxyl radical (·OH) and the superoxide anion (O_2^-).[16] The hydroxyl radical is particularly unstable and will react rapidly and non-specifically with most biological molecules. This species is produced from hydrogen peroxide in metal-catalyzed redox reactions such as the Fenton reaction. These oxidants can damage cells by starting chemical chain reactions such as lipid peroxidation, or by oxidizing DNA or proteins Damage to DNAcancause mutations andpossibly cancer.

Antioxidants that are reducing agents can also act as pro-oxidants. For example, vitamin C has antioxidant activity when it reduces oxidizing substances such as hydrogen peroxide however, it will also reduce metal ions that generate free radicals through the Fenton reaction

.Antioxidants are found in varying amounts in foods such as vegetables, fruits, grain cereals, eggs, meat, legumes and nuts. Some antioxidants such as ascorbic acid can be destroyed by long-term storage or prolonged cooking. Other antioxidant compounds are more stable, such as the polyphenolic, antioxidants in foods such as whole-wheat cereals and tea.

Antioxidant compounds	Foods containing high levels of these antioxidants
Vitamin C (ascorbic acid)	Fresh Fruits and vegetables
Vitamin E (tocopherols, tocotrienols)	Vegetable oils
Polyphenolic antioxidants (resveratrol,flavonoids)	Tea, coffee, soy, fruit, olive oil, chocolate, cinnamon,oregano and red wine
Carotenoids (lycopene, carotenes,lutein)	Fruit, vegetables and eggs.[230]

Other antioxidants are not vitamins and are instead made in the body. For example, ubiquinol (coenzyme Q) is poorly absorbed from the gut. Another example is glutathione, which is made from amino acids. As any glutathione in the gut is broken down to free cysteine, glycine and glutamic acid before being absorbed, even large oral doses have little effect on the concentration of glutathione in the body .

During exercise, oxygen consumption can increase by a factor of more than This leads to a large increase in the production of oxidants and results in damage that contributes to muscular fatigue during and after exercise. The inflammatory response that occurs after strenuous exercise is also associated with oxidative stress, especially in the 24 hours after an exercise session. The immune system response to the damage done by exercise peaks 2 to 7 days after exercise, which is the period during which most of the adaptation that leads to greater fitness occurs. During this process, free radicals are produced by neutrophils to remove damaged tissue. As a result, excessive antioxidant levels may inhibit recovery and adaptation mechanisms Antioxidant supplements may also prevent any of the health gains that normally come from exercise.

Discussion

Antioxidants are classified into two broad divisions[1], depending on whether they are soluble in water (hydrophilic) or in lipids (hydrophobic). In general, water-soluble antioxidants react with oxidants in the cell cytosol and the blood plasma, while lipid-soluble antioxidants protect cell membranes from lipid peroxidation[5]. These compounds may be synthesized in the body or obtained from the diet[4]. The different antioxidants are present at a wide range of concentrations in body fluids and tissues, with some such as glutathione[3] mostly present within cells, while others such as uric acid are more evenly distributed.

The relative importance and interactions between these different antioxidants is a very complex question, with the various metabolites[8] and enzyme systems having synergistic and interdependent effects on one another. The action of one antioxidant may therefore depend on the proper function of other members of the antioxidant system[l] The amount of protection provided by any one antioxidant will also depend on its concentration, its reactivity towards the particular reactive oxygen species being considered, and the status of the antioxidants with which it interacts Some compounds contribute to antioxidant defense by chelating transition[9] metals and preventing them from catalyzing the production of free radicals in the cell.

Ascorbicacid or"vitaminC"isa monosaccharide oxidation-reduction[1] catalyst found in both animals and plants and must obtain it from the diet. Most other animals are able to produce this compound in their bodies and do not require it in their

diets. Ascorbic acid is required for the conversion of e procollagen[15] to collagen by oxidizing prolineresidues to hydroxyproline. In other cells, it is maintained in its reduced form by reaction with glutathione, which can be catalysed by protein disulfide isomerase and glutaredoxins.

Uric acid (UA) is an oxypurine[4] produced from xanthine by the enzyme xanthine oxidase, and is an intermediate product ofpurine metabolism., Urate oxidase further catalyzes the oxidation of uric acid to allantoin[].

Glutathione is a cysteine-containing peptide found in most forms of aerobic acid. It is not required in the diet and is instead synthesized in cells from its constituent amino acids. Glutathione has antioxidant properties since the thiol group in its cysteinemoiety is a reducing agent and can be reversibly oxidized and reduced. In cells, glutathione is maintained in the reduced form by the enzyme glutathione reductase and in turn reduces other metabolites[13] and enzyme systems, such as ascorbate in theglutathione-ascorbate cycle.

Melatonin[16] is a powerful antioxidant and, unlike conventional antioxidants such as vitamins C and E and glutathione, it is both produced in the human body and is acquired in the diet.

Vitamin E is the collective name for a set of eight related tocopherols[3] and tocotrienols, which are fat-soluble vitamins with antioxidant properties. Of these, α-tocopherol has been most studied as it has the highest bioavailability[16], with the body preferentially absorbing and metabolising this form. It has been claimed that the α-tocopherol[15] form is the most important lipid-soluble antioxidant.[16].

Summery

There was evidence that antioxidant supplements promote disease and increase mortality in human. It was previously proposed on a hypothetical basis that free radicals may induce an endogenous response culminating in more effective adaptations which protect against exogenous radicals and possibly other toxic compounds Recent experimental evidence strongly suggests that this is indeed the case, and that such induction of endogenous free radical production extends the life span most importantly.

As with the chemical antioxidants, cells are protected against oxidative stress by an interacting network of antioxidant enzymes Here, the superoxide released by processes such as oxidative phosphorylation is first converted to hydrogen peroxide and then further reduced to give water.

Catalases are enzymes that catalyse the conversion of hydrogen peroxide to water.Oxidative stress is thought to contribute to the development of a widerange of diseases including Alzheimer's disease, Parkinson's disease the pathologies caused by diabetes, rheumatoidarthritis, age related maculardegeneration and neurodegeneration in motor neuron diseases .Oxidative damage in DNA can cause cancer. However, several antioxidant enzymes such as superoxide dismutase, catalase, glutathione peroxidase, glutathione reductase, glutathione S-transferase etc. protect DNA from oxidative stress.

Conclusion

The brain is uniquely vulnerable to oxidative injury, due to its high metabolic rate and elevated levels of polyunsaturated lipids, the target of lipid peroxidation Consequently, antioxidants are commonly used as medications to treat various forms of brain injury. Here, superoxide dismutase, mimetic sodium thiopental are used to treat reperfusion injury and brain injury and in the treatment of stroke. These compounds appear to prevent oxidative stress in neurons and prevent apoptosis and neurological damage. Antioxidants are also being investigated as possible treatments for neurodegenerative diseases such as Alzheimer's disease Parkinson's disease, and amyotrophic lateral sclerosis, and as a way to prevent noise-induced hearing loss. . People who eat fruits and vegetables have a lower risk of heart disease and some neurological diseases and there is evidence that some types of vegetables, and fruits in general, protect against some cancers Since fruits and vegetables happen to be good sources of antioxidants, this suggested that antioxidants might prevent some types of diseases.. This suggests that these health benefits come from other substances in fruits and vegetables or come from a complex mix of substances.

Combinations of antioxidants, like the "ACES" products that contain beta carotene , vitamin C, vitamin E and Selenium, or herbs that contain antioxidants - such as green tea . Although some levels of antioxidant vitamins and minerals[15] in the diet are required for good health.

While antioxidant supplementation is widely used in attempts to prevent the development of cancer, it has been proposed that antioxidants may, paradoxically, interfere with cancer treatments This was thought to occur since the environment of cancer cells causes high levels of oxidative stress, making these cells more susceptible to the further oxidative stress induced by treatments..

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