



Supplement use and healthy ageing

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Introduction

Ageing is the inevitable, biological venture that all humans take part in from the moment they are born. After growth, the body slowly begins its physical and functional decline. There are many theories to explain this phenomenon, but the accumulation of cell damage caused by oxidation and the formation of free radicals appears to be the underlying cause. This brings forth the idea that the effects of ageing may be countered by antioxidants, which happen to exist as vitamins and minerals. There are also certain lifestyle behaviours that one can adopt to promote longevity, such as frequent exercise and healthy eating habits. If one is unable to accumulate sufficient nutrients through dietary measures, supplement use may be beneficial in slowing the effects of ageing. In spite of this, studies show that excessive use of supplements could have a detrimental impact on health.^{1,2,3}

Natural healthy ageing

Studies have shown that lifestyle habits at a young age significantly influence one's health later in life. Healthful living should therefore be a lifelong aspiration, and not only begin at a later stage in life.^{1,4} Despite there being no way to prevent the ageing process, eliminating unhealthy habits, exercising regularly and eating nutrient-dense foods can improve longevity.⁴

In entering the later stages of life, greying hair and gathering wrinkles are only two of the many natural physiological changes that will occur. Loss of bone and lean muscle mass, gastrointestinal changes, as well as sight and hearing degeneration are all characteristic of the ageing process. Furthermore, free radicals caused by oxidation begin to

damage the body's immune system, causing older people to grow more susceptible to disease.^{1,2,3}

Older adults have lower energy requirements than younger people, as a result of decreased energy expenditure and a slower basal metabolic rate. Although this implies that the older person should eat less food to maintain their normal weight, nutrient requirements still remain high. Exercise can be beneficial in this regard as increasing one's activity level can allow for a greater caloric and nutrient intake.⁴

Another characteristic of ageing is the decreased ability of the body to effectively absorb and utilise nutrients. For this reason, it is advised that the older person consumes a nutrient-dense diet containing whole grains, fruits, vegetables and dairy products.¹ Fruits and vegetables are rich sources of antioxidants which help combat the damaging oxidative effects associated with ageing.³ Many older people, however, are unable to acquire an adequate amount of nutrients through diet alone. Some begin to lose the ability to perceive taste, touch and smell. In addition to this, poor oral health, difficulty swallowing, gastrointestinal discomfort and the use of certain medications may contribute to the adoption of sub-optimal eating habits and consequently, nutrient deficiencies.^{1,3,4}

The role of vitamin and mineral supplements

In some cases, it is almost impossible to ensure adequate vitamin and mineral intake in the older adult, thus making dietary supplementation an essential course of action. Lack of sufficient nutrients can accelerate ageing and lead to the development of age-related diseases.^{1,2,5} Cardiovascular disease is one of the many consequences of oxidative stress in the body. This includes the risk of developing atherosclerosis,

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ischaemia, hypertension and congestive heart failure. Furthermore, neurological disorders, particularly Alzheimer's disease, are far more likely to develop in the presence of reactive oxygen species in the body. Chronic obstructive pulmonary disease (COPD), rheumatoid arthritis and renal disease are further examples of how age-related oxidation can cause harm to the body.

The intake of antioxidants has neutralising effects on free radicals. Although it is preferable that these antioxidants come from diet alone, antioxidant supplementation (extracted from food or chemically synthesised) can be beneficial.^{3,5} Some of these nutrients include vitamins E, A, C, selenium and zinc.³

Studies show that when taken in combination and in small amounts, antioxidant supplements can be beneficial in preventing diseases associated with ageing. It is advised that a multivitamin and mineral supplement which contains no more than 100% of the Daily Recommended Intake (DRI) of a particular nutrient be consumed. It is important to note that when taken in excess, supplements can accelerate the oxidation process, leading to toxic effects and greater risk of disease. It is advisable to consult a medical professional before deciding to take any nutritional supplements.

Vitamin E

Alpha-tocopherol is the naturally occurring form of vitamin E and is essential for human life. It is a fat-soluble vitamin and has powerful antioxidant properties. It functions to prevent the formation of free radicals when fat is metabolised in the body. This decreases the risk of oxidative stress and disease development. In addition to this, Vitamin E protects the immune system from degeneration, protects blood vessels from damage and regulates gene expression.^{3,6} The DRI of vitamin E is 15 mg/day and should not exceed 1 000 mg/day. Excessive intake of vitamin E can result in toxic effects and have a negative impact on health and ageing.⁴

Vitamin A

Beta-carotene is the pro-vitamin form of vitamin A. Beta-carotene functions to eliminate free radicals and is converted to retinol, which is essential in maintaining healthy vision. The DRI for vitamin A is 700 and 900 µg for females and males respectively. Vitamin A has an upper limit of 3 000 µg when taken as a supplement.^{3,4}

Vitamin C

Also called ascorbic acid, vitamin C is a water-soluble antioxidant which works alongside vitamin E in preventing oxidative damage to cells. It is also known to strengthen immunity and prevent the development of certain cancers. The DRI for vitamin C is 75 mg and 90 mg for females and males respectively.^{3,4}

Selenium

Selenium is a trace mineral which acts as an antioxidant. It is essential for immune function and may be beneficial in preventing lung and prostate cancers. Selenium has a DRI

of 55 µg/day and a tolerable upper limit of 400 µg/day. Excess intake of this trace mineral is not recommended.^{3,4}

Zinc

Zinc is an essential component in the body's antioxidant defence system. The DRI for zinc is 8 and 11 mg for females and males respectively. Intake should not exceed 40 mg.⁴

Other supplements

Other nutrients associated with having antioxidant properties include Omega-3 and Omega-6 fatty acids. These long-chain polyunsaturated fats cannot be synthesised by the body and must be consumed in food or taken as a supplement. Omega-3 and -6 are essential in maintaining healthy cognitive function and can prevent neurological degeneration in older people. The daily intake of Omega-6 fatty acids should be up to four times the intake of Omega-3 fatty acids.^{3,7}

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Conclusion

Ageing is caused by the uncontrolled oxidation of compounds in the body, which can lead to the development of age-related disease and functional impairment. In spite of this, healthy ageing can be achieved naturally through lifestyle change. Adequate intake of nutrients with proven antioxidant properties can effectively slow the effects of ageing. In cases where these nutrients aren't provided for through one's diet, it is advisable to take antioxidant supplements. Caution should be taken when choosing to take a supplement as toxic levels of nutrients can cause severe damage to one's health. If every person follows the simple steps to healthful aging, we would all age more gracefully.

References

1. Mahan L, Raymond J. Krause's food and the nutrition care process. 14th ed. St Louis: Elsevier 367-376.
2. Sadowska-Bartosz I, Bartosz G. Effect of antioxidants supplementation on aging and longevity. *BioMed Research International*. 2014;2014:1-17.
3. Pham-Huy LA, He H, Pham-Huy C. Free radicals, antioxidants in disease and health. *Int J Biomedical Science*. 2008;4(2):89-96.
4. Whitney E, Rady Rolfes S. *Understanding nutrition*. 14th ed. Stamford: Cengage; 564-567.
5. Assmann K, Andreeva V, Jeandel C, et al. Healthy aging 5 years after a period of daily supplementation with antioxidant nutrients: A post hoc analysis of the French randomized trial SU.VI.MAX. *American Journal of Epidemiology* 2015;182(8):694-704.
6. Office of Dietary Supplements - Vitamin E [Internet]. Ods.od.nih.gov. 2018 [cited 13 February 2018]. Available from: <https://ods.od.nih.gov/factsheets/VitaminE-HealthProfessional/>
7. Head E. Oxidative damage and cognitive dysfunction: antioxidant treatments to promote healthy brain aging. *Neurochemical Research*. 2008;34(4):670-678.