INTRODUCTION

Most of us are aware that living in cities, we are highly exposed to environmental pollution, toxins, leading to formation of free-radicals, due to increase in technological advancement compared to those living in the countryside. This has unfortunately led to the development of life threatening diseases such as cancer and autoimmune conditions such as Systemic Lupus Erythematous, age-related macular degeneration.

In order to minimise the above conditions let us briefly look at how the free radicals are produced and affect us.

WHAT ARE FREE RADICALS

These are, "atoms or molecules with unpaired electrons"(Gropper, Smith&Groff, 4th edition, 2005), possessing higher energy and generated by our cells within the body in response to "oxidative stress"(Steel, 2006) which is contributed by air & water pollution, poor quality foods i.e. rancid food especially vegetable oils heated to high temperatures, radiation from microwave, computer video display terminals & other sources, carcinogenic compounds such as acetaldehyde produced by the liver after alcohol consumption, in cigarette smoke, stress, infection, injury, aging and drugs.

Free-radicals causes oxidative damage to the, "body's DNA, cell membranes, proteins and other compounds"(Kohlmeier, 2003, p.457) as oxygen is metabolised thus their action could increase the risk of cancers, cardiovascular diseases, premature ageing, arthritis and other disorders.

WHAT ARE ANTIOXIDANTS

"Antioxidant" as the name suggests "against oxidation" which therefore means these are naturally occurring chemical nutrients found in foods that protect our cells from damaging effects of free-radicals by, "preventing or slowing down oxidative damage to the body"(HealthCastle.com, 2007) and they are thus known as free-radical scavengers.

There are different types of antioxidants but don't get confused with Phytochemicals which are, "non-nutritive plant chemicals that are not required by the human being for sustaining life but have disease preventive properties"(website of Linnea, 2008) and therefore they also exhibit antioxidant action.

Let us closely look at different types of antioxidants and the recommended dosage:

Major Antioxidants:

Vitamin A- is a fat-soluble vitamin, essential for vision, regulation of cell growth and strengthens the immune function. Daily dosage should be between 700-900micrograms(Kohlmeier, 2003, p.465) and hence excess of it especially during early pregnancy can lead to birth defects.

Vitamin C- is a water-soluble vitamin and a powerful antioxidant. It is essential for collagen synthesis, gums and soft tissues, brain and nerve functioning and a co-factor for other nutrient metabolism. At least between 70-90mg/day (Gropper, Smith&Groff, 2005) should be taken by adults.

Vitamin E- is a fat-soluble super antioxidant and protects against approximately 80 diseases. The recommended dosage for adults would be 15mg/day.

Zinc- it is one of the main cofactor for numerous enzymatic reactions taking place within our bodies therefore deficiency can result in different signs and symptoms such as dry scaly skin, acne. At least 8 to 11mg/day should be taken by adults for optimum functioning of enzymatic processes.

Selenium- it is a major antioxidant and essential for insulin function, thyroid hormone for fat metabolism and regulation of cell growth. Since Australian soils are deficient in Selenium hence it would be wise take supplements of selenium and the required dosage for an adult would be 55microgram/day (Kohlmeier, 2003).

Glutathione- it is the body's key antioxidant, amino acid made from cysteine,

glutamine and glycine, hence, "deactivates free radicals built by oxidative stress"(Steel, 2006). Suggested range would be 100-500mg.

Other forms of antioxidants include:
Lipoic acid- it aids in liver detoxification, enhances effects of vitamin C, E, Glutathione and lowers blood cholesterol levels thus effective for cardiovascular diseases.

Coenzyme Q10- found in every cell of our body and it is a cellular oxygenator. Its availability decreases as we age and in response to stress, infection, medications and poor diet. Individuals with cardiovascular diseases are deficient in coenzyme Q10.

Grape Seed Extract- Studies have shown that it is more effective as an antioxidant than Vitamin C and E. It contains bioflavonoid called Oligomeric Proanthocyanidins, which protects the cells from oxidative damage and also assists the entry of vitamin C in the cells.

Methionine- an essential amino acid that protects the liver and arteries by inhibiting build up of fat thus allowing blood to flow through major organs such as the heart, brain. Moreover it is one of the major nutrients required in the liver detoxification pathways.

Lycopene- it is a, "red-coloured powerful antioxidant"(Glovannucl, Ascherio, Rimm, 1995), which has proved to be very effective for different types of cancers and cardiovascular diseases. Its absorption relies on fat, for example tomatoes, which are rich in lycopene, can be cooked with olive oil to increase the absorption.

Lutein- it is a yellow- coloured pigment found in plants and in the retina. It protects against cataract formation and macular degeneration, which are responsible for decreasing vision especially in the older people.

Quercetin- potent antioxidant to protect against cardiovascular diseases and prevents from carcinogenic actions within the cells that may initiate metastasis of cancer cells.

We have to take these antioxidants in appropriate dosages as excess or deficiency results in unwanted symptoms.

BENEFITS OF TAKING ANTIOXIDANTS
There were studies done in vitro and vivo to determine if antioxidants actually worked and it was proved that continuous consumption of these antioxidants slowly reduced different kinds of degenerative diseases.

The following are some of the advantages of taking antioxidants:
1). REDUCTION AND PREVENTION OF DIFFERENT FORMS OF CANCER:
There is a rapid increase in the population of having different forms of cancer and those who survive after continuous use of chemotherapy and

radiation therapy are considered to be lucky.

Complementary medicine becomes very useful in individuals undergoing chemotherapy and some of them have actually overcome the harmful side effects of these treatments such as anorexia, depression, alopecia (hair loss). Use of antioxidants is an effective way to further reduce the risk of having cancers and tumours.

In 2005, study was carried out on "540 patients undergoing radiation therapy with head and neck cancer"(Michael Smith, 2008) to get antioxidant beta-carotene (vitamin A) and alpha tocopherol (vitamin E). It was found that those patients who took these antioxidants reduced side effects by 38%.

There were "new findings that antioxidants actually induced apoptosis (programmed death) of cancer cells"(Carmia Borek, 2004) and further more reduced harmful side effects of radiation therapy. Studies that were carried out showed that use of Selenium actually induced death of prostate cancer cells. Moreover, use of Vitamin E and C during radiation treatment of prostate and cervical cancer have shown to protect against severe rectal bleeding and anorectal pain.

2). PREVENTION OF CARDIOVASCULAR DISEASES:

From the media, we all must have realised that Obesity and risk of having heart diseases is increasing drastically in Australia due to so many factors, one of them is having 'junk foods'. Children are more exposed to poor quality foods and as a result steady increase in childhood obesity. However, use of antioxidants has reduced the risk of further complications in individuals with cardiovascular problems.

There were studies carried out on 2002 patients with Coronary Artery Disease (CAD) using vitamin E supplementation and was found that it actually prevented cardiovascular death, myocardial infarction and thus increased life expectancy. (Cambridge Heart Antioxidant Studies, 23 March 1996).

Further studies in vitro showed that combination of antioxidants such as vitamin E, vitamin C and beta-carotene was more cardio protective and thus one should have try to have a diet consisting of these antioxidants. (University of Birmingham, 1999).

3). AGE-RELATED MACULAR DEGENERATION:

As we get older, our ability to see objects clearly starts to decrease and if we are not having adequate nutrients from the diet then we are bound to

have advanced macular degeneration, which finally lead to vision loss. Therefore we should have these antioxidants either in our diet or by supplementation to minimise the risk of visual impairment.

Research was carried out on elderly patients with the risk of developing advanced age-related macular degeneration. These patients were supplemented with high dose of vitamin C, vitamin E, beta-carotene and Zinc. It was found that risk of vision loss was reduced by 19%(National Eye Institute, 2006).

4.AGE RELATED PROTECTION:

Before industrial revolution, our forefathers used to live on raw fruits and vegetables, nuts and seeds, animal meat that was without any preservatives or processing done. Hence it's not surprising that they lived longer and with minimum degenerative diseases compared to the present generation. So how can we slow our rate of ageing? The answer is to increase fresh food consumption without being processed, as it is rich in antioxidants and other beneficial nutrients, which the body can easily utilise.

Use of vitamin E "slowed the aging process and forestall premature wrinkling"(Craven Lyn, 2008, p.28). Vitamin E does this by terminating free radical reaction and thus inhibiting cell membrane destruction. Moreover supplementing with antioxidants especially Grape Seed Extract prevents collagen destruction and improves skin elasticity.

Recent studies have shown that continuous consumption of red wine has minimised premature ageing and degenerative diseases such as tumour progression, cardiovascular diseases, and cancer. This is due to high levels of phenolic acid in red wine together with other antioxidants such as catechins, resveratrol, anthocyanins and flavonoids that all act as free radical scavengers and prevent oxidative stress. (Trakia Journal of Sciences, 2008).

NATURAL CONCENTRATION OF ANTIOXIDANTS

Did you know that just a single bite of green leafy vegetable or a fruit has thousands of different powerful antioxidants that inhibits cancer cell proliferation, aging process, decrease cholesterol and other beneficial properties? Yes, indeed and as the saying goes on, "An Apple a Day keeps the Doctor away", therefore we should increase the following in our daily meals:

Alfalfa sprouts- highly nutritious with beta-carotene, chlorophyll, vitamin A, C, E, B12, D, K, calcium, iron, magnesium and other minerals. Moreover it

contains 8 enzymes for digestion, cleanse the body by detoxification and assists in recovery from alcohol addiction.

Buckwheat- excellent source of Rutin, a bioflavonoid, which strengthens the walls of capillaries and blood vessels and increases circulation. Also an, "antidote against x-rays and other radiations"(Pitchford Paul, 2002, p.462).

Cereal Grass- this include wheat and barley grass containing chlorophyll and one of the most important, "antioxidant enzyme known as Superoxide Dismutase that slows cellular deterioration and mutation"(Pitchford Paul, 2002, p.240) thus aids in reversal of aging process and treatment of degenerative diseases.

Broccoli- rich source of vitamin A, C, and chlorophyll but in case of thyroid disorders.

Cabbage- contains substance U for healing duodenal ulcers, vitamin C, E and Iodine. Studies have revealed that it inhibit cancerous growth in large intestine.

Lettuce- high in vitamin A, C, chlorophyll and iron. It can increase the production of mother's milk and treat haemorrhoids.

Tomatoes- rich source of lycopene, which decreases risk of cervical and prostate cancer. Cooking tomatoes with olive oil increases its lycopene content.

Green tea- studies have proved in vitro that polyphenol which is high in tea inhibits oxidative stress and skin, colon, lung, liver and pancreatic cancer. (American society for Nutritional Sciences, 2003).

Berries- such as blueberries, strawberries, cranberries are considered to have highest source of antioxidants. Others include: blackberries, raspberries, bilberry and blackcurrant.

Nuts and Seeds- this include raw walnuts, sunflower seeds, groundnuts, hazelnuts and pecans. They are rich source of beneficial antioxidants such as polyphenols that are responsible for cancer prevention and lowering Low Density Cholesterol.

SUPPLEMENTS HIGH IN ANTIOXDANTS

Studying Nutritional Medicine and at the same time working at a Health Food Store has exposed me to so many different supplements and organic dried foods and those supplements that are in demand by the customers.

As more and more natural supplements are available in the market and therefore we should be grateful and maximise their use especially in this

generation whereby we are highly exposed to toxins.

ORAC, which stands for Oxygen Radical Absorbance Capacity, is a standard measurement of antioxidant power and therefore the following substances have very high ORAC value:

Blueberry bliss- it is a nutritious snack of dried blueberries coated with dark chocolate and hence high in antioxidants with bioflavonoids. Available in a well sealed packet.

Superfruit Combo- combination of dried fruits such as blueberries, cranberries, gojiberries, prunes and apples thus increasing antioxidant effect, available in well-sealed packets.

Tibetan Goji Berries- nature′s best antioxidant with vitamin C and certified organic, available in well-sealed packets.

Pomegranate Juice- extremely high in antioxidant content and thus effective for many degenerative diseases. Recent studies showed that only 1 glass of this juice daily slowed Alzheimer′s disease, prostate and lung cancer (Strachan Tim, 2008, pp.44-46).

Nature′s Sunshine CoenzymeQ10- supports heart health by lowering oxidation of LDL cholesterol and assists in recovery after exercise.

Spirulina- one of the most nutrient dense substance with antioxidants, beta-carotene, iron, vitamin B12and the most absorbable form of proteins.

Ningxia Red Juice- it is proven to be the highest antioxidant juice with the ability to destroy dangerous and abundant free radicals.

Vital Greens- Australia′s major super food consisting of antioxidants, vitamins, trace minerals, essential amino acids, probiotics, omega 3 and 6, digestive enzymes and fibres. Available as powder in sachets, and jars.

Grape Seed Extract- good antioxidant supplementation due to its powerful content of Oligomeric Proanthocyanidins. Available in capsules and tablets.

Lakewood Organic Acai Juice- it is 100% organic fruit juice with very high ORAC value together with essential omega oils thus an excellent source of antioxidants.

Let us all be honest that we do have takeaway meals, take alcohol or smoke cigarette and so if you start taking these antioxidants either in your diet or as a supplement you would be surprised by its outcome.

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