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Herbs with Antioxidant, Vascular Protective and Cancer Preventative Activities

Free Radicals, Oxidants & Antioxidants

Free radicals are highly reactive substances which contain an unpaired electron. They are generated in biological systems both under normal and pathological conditions. In addition to free radicals the body generates oxidising agents which can produce free radicals.[1] For simplicity these are referred to as oxidants.

Sites of oxidant generation include:[2]
- Mitochondrial electron transport (as a by-product of cellular respiration).
- Peroxisomal fatty acid metabolism (as a byproduct).
- Cytochrome P-450 reactions (as a result of detoxifying toxins).
- Phagocytic cells (which attack pathogens with a mixture of oxidants and free radicals). Chronic phagocytic activity results in chronic inflammation.

The targets of endogenous oxidants include lipids, nucleic acids and proteins.[1,2] Oxidative stress is a disturbance in the balance between the production of oxidants and the body's antioxidant defences, in favour of the former. Oxidative stress plays a role in:[2-5]
- provoking immune response, killing bacteria;
- atherosclerosis, cardiovascular disease, cancer;
- CNS disorders such as Parkinson's disease, Alzheimer's disease and stroke;
- ageing and other associated degenerative diseases including immune system decline, brain dysfunction and cataracts;
- the pathogenesis of alcoholic and toxic liver diseases and viral hepatitis.

Oxidant concentration may also be raised in physically active individuals and those with chronic illnesses including HIV infection.[3,4]

Grape Seed

Grape Seed extract is obtained from the seeds of red or white grapes (*Vitis vinifera*) and contains oligomeric procyanidins (OPCs) which are made up of 2, 3 or 4 units of (+)-catechin and (-)-epicatechin.[5]
OPCs have demonstrated:
- antioxidant activity *in vitro* and *in vivo*,[8,6]
- vascular protective activity *in vivo*,[7,8]
- extension of the activity of vitamin C *in vivo*,[8]
- connective tissue strengthening activity *in vitro*,[9]
- hypocholesterolaemic and antiatherogenic activity *in vivo*,[10,11]
- beneficial effects on platelet function *in vivo*,[9]
- improvement in bowel flora *in vivo*,[12]
- good absorption and distribution profiles *in vivo*.[8]

OPCs administered in clinical trials have:[7,13]
- improved visual performance;
- improved capillary resistance in elderly patients and in cirrhosis of the liver, in hypertensive and diabetic patients, and in peripheral venous insufficiency;
- reduced post-operative and sport's injury oedema;
- improved blood flow in varicose veins;
- improved symptoms of retinopathy and ocular stress.
- improved premenstrual symptoms.

Green Tea

Green Tea is the unprocessed, dried, young leaves of *Camellia sinensis*. The main active constituents are polyphenols including epigallocatechin gallate (EGCG). The polyphenols have demonstrated potent antioxidant activity *in vitro* and *in vivo* and in volunteers.[14] The polyphenols are absorbed rapidly after ingestion of Green Tea and cause an increase in plasma antioxidant status.[15]

Green Tea has demonstrated anticarcinogenic activity in experimental models, epidemiological studies and in patients.[17] The mechanisms of action of the polyphenols are most likely related to the antioxidant activity, modulation of metabolic enzymes, inhibition of tumour promotion and modulation of mitotic signal transduction.[16]

Consumption of Green Tea prior to clinical cancer onset has been associated with improved prognosis of stage I and II breast cancer.[17] Many of the epidemiological findings indicate an inverse association between Green Tea and cancer. A 1998 review of studies found: 17 showed inverse association between Green Tea intake and cancer incidence, 7 showed a positive risk, 3 had no association, 5 were positive with hot temperature of the tea. The cancer

types studied were colon, rectal, urinary, stomach, pancreatic, oesophageal and lung.[17] Green Tea is being investigated clinically in prostate cancer and advanced solid tumour trials.[18,19] Epidemiological studies have also shown Green Tea to have a preventive effect against atherosclerosis and coronary heart disease.[20,21]

Turmeric

Active constituents of *Curcuma longa* rhizome include an essential oil containing sesquiterpenes and the yellow pigments including curcumin and methoxylated curcumins.[22]

There is extensive scientific information outlining the cancer preventative activities of curcumin and Turmeric. Results indicate that curcumin may alter the metabolism of carcinogens that require hepatic microsomal activation. Turmeric increases the activity of the carcinogen-detoxifying enzyme, glutathione-S-transferase *in vivo*. The inhibitory effect of curcumin on tumour promotion is related to its antioxidant and anti-inflammatory activity. The combination of Turmeric and catechin (found in Green Tea and Grape Seed) was more effective than treatment with the individual components. The cancer preventative activity of curcumin is observed when it is administered prior to, during, and after carcinogen treatment.[25]

Rosemary

Rosmarinus officinalis contains essential oil, phenolic diterpenes (including carnosol and rosmarinic acid), flavonoids and triterpenoids.[23]

Rosemary is a strong antioxidant used in the food industry as a preservative, particularly for meat products.[24] The antioxidant activity is attributed to the diterpenes, particularly carnosol and carnosic acid.[25] Interestingly Rosemary has a strong *in vitro* antioxidant activity in saturated fats[26] which is unusual as most antioxidant plant extracts and phytochemicals demonstrate activity in aqueous systems. Rosemary could have a valuable role in the treatment and prevention of lipid peroxidation resulting in atherosclerosis.

Experimental studies have indicated Rosemary leaf also has hepatoprotective activity[27] and has reduced the development of mammary carcinoma.[28] The hepatoprotective activity has been attributed to the antioxidant phenolic compounds.[30]

Synergistic Formulation

These herbs would complement each other in a potent formulation with the following actions:

- antioxidant, cancer preventative,
- vascular protective, venotonic,
- antiallergic,
- as a cofactor for vitamin C intake,
- stabilisation of connective tissue tone.

Indications

- Prevention and treatment of cancer, cardiovascular disease and diseases associated with ageing.
- Treatment of hypercholesterolaemia, lowered capillary resistance (eg in diabetes and hypertension), liver diseases, allergic and inflammatory conditions including arthritis, asthma, rhinitis.
- To improve day and night vision, retinal damage, diabetic retinopathy.
- Venous insufficiency, varicose veins, oedema.

Cautions and Contraindications

Due to the potential for antiplatelet activity from Turmeric high doses should be used cautiously in patients with haemorrhagic disorders and in those taking warfarin or antiplatelet drugs.

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