

Introduction

Evidence suggests that selenium (Se) is the most effective broad spectrum anti-cancer agent yet found. It is also involved in antioxidant defence mechanisms, thyroid metabolism, immunocompetence, mood states, and limiting the progression of severe viral diseases, including HIV and hepatitis C.

Most of us do not consume enough Se to provide maximum protection against cancer. The average Australian adult intake of Se is around 75 micrograms (μg)/day, whereas optimum intake is likely to be around 250 μg /day for males and 150 for females. Several studies have shown that Se and vitamin E are particularly beneficial for male smokers.

According to a proposed two-stage model of cancer prevention, which involves Se intakes that correct nutritional deficiency as well as much higher, supranutritional intakes, individuals with nutritionally adequate Se intakes may benefit from Se supplementation. Se's anti-cancer activities remain under intensive study worldwide.

Evidence

There is a wealth of evidence to support both a preventive and a treatment role for Se against prostate cancer. Research findings include:

- The Nutritional Prevention of Cancer Trial in the USA found a yeast supplement of 200 μg Se/day reduced total cancer mortality by 41%, total cancer incidence by 25% and prostate cancer incidence by 52% in a cohort of 1,300 people. The effect on total cancer was limited to male smokers (current or previous) with baseline plasma Se levels below 113 $\mu\text{g}/\text{l}$, although non-smoking males below this level are likely to have benefited from Se supplementation in terms of prostate and colon cancer protection (Duffield-Lillico et al 2002).
- A study of 34,000 men found that those with low baseline Se levels were three times more likely to develop advanced prostate cancer than men with higher levels (Yoshizawa et al, 1998)
- In a test-tube study, selenomethionine (an organic Se form) caused a 50% reduction in prostate cancer, breast cancer and melanoma cells. A dose 1,000 times higher was required to inhibit the growth of normal cells (Redman et al, 1998).
- The growth of human prostate cancer cells was reduced by 98% by 2×10^{-6} M sodium selenite (the most commonly used inorganic Se form) in a test-tube study (Webber et al, 1985).

Mechanisms

While some cancer protection, particularly that through antioxidant activity, involves selenoenzymes, the anti-cancer effects of Se are likely to involve the production of specific anti-tumorigenic metabolites, such as methylselenol. Studies have suggested that Se provided in certain forms can neutralise carcinogens, enhance the immune system, alter gene (including p53) expression, inhibit tumour cell metabolism and neo-angiogenesis (blood vessel development around tumours), and promote apoptosis (programmed cell death).

Dose rates

Suggested prostate cancer preventive Se intake: 250 µg/day.

Suggested treatment Se intake: for example, as part of a prostate cancer “watchful waiting” program, or for recurrent prostate cancer, or to accompany chemotherapy or radiotherapy for various cancers: 300-1,000 µg/day. Se is more effective against prostate cancer when taken with gamma-tocopherol, a form of vitamin E found in sesame seed: take a tablespoon of *Tahini* per day.

NB: micronutrients like Se are required by the body only in small amounts.

Remember that 1 µg is equal to just one-thousandth of a milligram! Treatment doses of Se should not exceed 1,500 µg/day. The treatment of cancer and other serious illnesses should be supervised by a qualified medical practitioner.

Other natural anti-prostate cancer agents

Other supplements (with dietary sources) which may be beneficial in prostate cancer prevention and treatment include gamma-tocopherol (sesame seed), lycopene (tomato paste), genistein (red clover or soy extract), epigallocatechin-3-gallate (green tea), phenethyl isothiocyanate (watercress), gamma-linolenic acid (blackcurrant seed oil), resveratrol (grape seed), glycyrrhizin (licorice), vitamin D3-calcitriol (cod liver oil), vitamin C (high-dose calcium ascorbate, ie 5-12 grams/day), beta-sitosterol (Saw Palmetto), *Urtica* (stinging nettle) and Baikal skullcap.