

## Vitamin E and cancer: warning about supplements!

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*A study has shown that vitamin E supplements can lead to an increased risk of cancer in people who exhibit certain genetic variants.*

### INEFFECTIVE SUPPLEMENTS

Nutritional supplements, particularly vitamins, remain quite popular with nearly half of all Canadians consuming them each day. This popularity is quite astonishing because the results from a broad range of clinical studies have been quite clear: people who consume antioxidant supplements, whether they are multivitamins, vitamins C or E, or beta-carotene, show no decrease in the risk of cardiovascular diseases or of cancer<sup>1</sup>.

Not only are these supplements ineffective, but some studies have found several negative effects associated with the consumption of elevated doses of certain supplements. The vitamin E supplements seem to be particularly problematic, with a marked increase in the risk of lung cancer when combined with beta-carotene (in smokers), a significant increase in the risk of prostate cancer and a small increase in the risk of premature death. In the case of cancer, it seems that the presence of massive doses of vitamins which possess strong antioxidant activity (such as vitamin E) disturbs the delicate equilibrium which exists between the levels of free radicals normally generated by the cells and the natural antioxidant defenses of the organism<sup>2</sup>. Consequently, rather than prevent cancer, massive doses of antioxidants can paradoxically promote the development of this disease by interfering with the normal functions of the organism, most notably the systems involved in the elimination of early tumors.

### VARIATION BETWEEN INDIVIDUALS

One study recently suggested that the effects of vitamin E on the risk of cancer varied considerably according to the genetic “baggage” of the individuals who consumed the supplements<sup>3</sup>. By using data obtained from the *Women’s Genome Health Study* (23,294 participants) and the *Alpha-Tocopherol Beta-Carotene Cancer Prevention Study* (29,133 participants), the researchers examined the overall incidence of cancer in these cohorts as a function of genetic variation in the gene coding for catechol-O-methyltransferase (COMT), an enzyme involved in the metabolism of vitamin E. Since everyone has two copies (alleles) of each gene, these copies can thus be identical (homozygotes) or different (heterozygotes). For example, in the case of the COMT gene examined in this study, there are two principal homozygote variants called Met/Met and Val/Val as well as a heterozygote variant (Val/Met).



The results obtained showed a large difference in the risk of cancer depending on the nature of the variants in the COMT gene found in the participants in these two studies. In people who were Val/Val homozygotes, taking vitamin E increased the overall risk of cancer by 15% compared to a placebo, whereas in the Met/Met homozygotes, this risk was decreased by 14%. No effect of vitamin E was observed in the Val/Met heterozygotes.

The Met/Met and Val/Val homozygotes each represent about 25% of the population, the rest being heterozygous for the COMT gene. In practice, this means that vitamin E has no beneficial effects for  $\frac{3}{4}$  of the population, and  $\frac{1}{4}$  are actually at a higher risk of cancer by consuming it. Taking vitamin E is only advantageous for the Met/Met homozygotes who represent about 25% of the population. Because we do not know the COMT gene variants that we inherited from our parents, taking these vitamin E supplements thus represents a bet that is unlikely to pay off!

### USELESS RISK

This risk is even more useless because vitamin E can be easily obtained by simply having a good diet. Vegetable oils, nuts (and peanuts) and some fruits and vegetables such as avocados, spinach or asparagus are all very good sources of this vitamin and provide a supply that is adapted to our physiological needs and amply sufficient for the prevention of cancer.

- (1) Bjelakovic G et al. Antioxidant supplements and mortality. *Curr Opin Clin Nutr Metab Care*. 2014; 17: 40-44.
- (2) Sayin VI et al. Antioxidants accelerate lung cancer progression in mice. *Science Transl. Med*. 2014; 6: 221ra15.
- (3) Hall KT et al. COMT and alpha-tocopherol effects in cancer prevention: gene-supplement interactions in two randomized clinical trials. *J. Natl Cancer Inst.*, published online January 8 2019.