

Dietary intake of n 3 and n 6 fatty acids and the risk of prostate Cancer

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FROM ABSTRACT

Background: Laboratory studies have shown that n-3 fatty acids inhibit and n-6 fatty acids stimulate prostate tumor growth, but whether the dietary intake of these fatty acids affects prostate cancer risk in humans remains unclear.

Objective: We prospectively evaluated the association between intakes of

- 1) Alpha-linolenic (ALA; 18:3n-3) [plant, like flax seed, omega-3]
- 2) Eicosapentaenoic (EPA; 20:5n-3) [fish omega-3]
- 3) Docosahexaenoic (DHA; 22:6n-3) [fish and cold water algae omega-3]
- 4) Linoleic (LA; 18:2n-6) [plant omega-6, like corn, sunflower, safflower, peanut, soy oils]
- 5) Arachidonic acid (AA; 20:4n-6) [animal omega-6, but often formed from plant omega-6s] and prostate cancer risk.

Design: A cohort of 47,866 US men aged 40–75 y with no cancer history in 1986 was followed for 14 y.

Results: During follow-up, 2,965 new cases of total prostate cancer were ascertained, 448 of which were advanced prostate cancer.

ALA intake was unrelated to the risk of total prostate cancer. [KEY WORD: TOTAL]

In contrast, the multivariate relative risks (RRs) of advanced prostate cancer from comparisons of extreme quintiles of ALA from nonanimal sources and ALA from meat and dairy sources were 2.02 and 1.53, respectively.

[Wow, this means:

- 1) Those who had higher consumption of plant derived ALA omega-3 increased their risk of advanced prostate cancer by an average of 202%.
- 2) Those who had higher consumption of animal (meat and dairy) derived ALA omega-3 increased their risk of advanced prostate cancer by an average of 53%. One would not expect this.]

EPA and DHA intakes were related to lower prostate cancer risk.

The multivariate RRs of total and advanced prostate cancer from comparisons of extreme quintiles of the combination of EPA and DHA were 0.89 and 0.74, respectively. [This means an 11% decrease for those taking EPA and a 26% decrease for those taking DHA].

LA and AA intakes were unrelated to the risk of prostate cancer.

Conclusions: Increased dietary intakes of ALA may increase the risk of advanced prostate cancer.

In contrast, EPA and DHA intakes may reduce the risk of total and advanced prostate cancer.

THESE AUTHORS ALSO NOTE:

Dietary fat has been one of the most frequently investigated modifiable risk factors for prostate cancer.

"In recent years, interest has turned to the intake of specific fatty acids rather than to total fat intake, notably n-3 and n-6 fatty acids, and their ratios."

"Alpha-Linolenic acid (ALA; 18:3n-3) is the principal dietary n-3 fatty acid in most Western diets; it is present in some vegetable oils and nuts, leafy vegetables, and animal fats."

"ALA can serve in a limited capacity as a precursor for eicosapentaenoic acid (EPA; 20:5n-3) and docosahexaenoic acid (DHA; 22:6n-3)" [KEY WORD: LIMITED].

"The concentrations of EPA and DHA are high in fish oils and they consistently inhibit tumor cell growth in animal models and in cell lines from human prostate tumors."

"Linoleic acid (LA; 18:2n-6) is the most abundant n-6 fatty acid in the human diet, and it is found primarily in vegetable oils."

"Long-chain n-6 fatty acids [arachidonic acid is 20 carbons long] enhance prostate tumor cell growth in human prostate tumor-derived cell lines."

"AA-derived eicosanoids, such as prostaglandin E2, strongly stimulate prostate tumor growth in animal models or prostate tumor-derived cell lines."

AA is converted to prostaglandin E2 by the enzyme cyclooxygenase-2, which is inhibited by omega-3 fatty acids.

"EPA and DHA inhibit cyclooxygenase-2 and the formation of prostaglandin E2 from AA."

In a prior study, ALA was positively related to risk of advanced prostate cancer.” [Giovannucci E, Rimm EB, Colditz GA, et al. A prospective study of dietary fat and risk of prostate cancer. J Natl Cancer Inst 1993;85:1571–9].

A 2003 study of 2,482 cases found an inverse relation of fish and marine fatty acid intake with prostate cancer risk .

[Augustsson K, Michaud DS, Rimm EB, et al. A prospective study of intake of fish and marine fatty acids and prostate cancer. Cancer Epidemiol Biomarkers Prev 2003;12:64–7].

These authors considered ALA intake from meat and dairy sources, and ALA from plant sources separately.

“We evaluated intakes of ALA from meat and dairy sources, ALA from nonanimal sources, and EPA, DHA, LA, and AA in relation to various risk factors for prostate cancer to assess the potential for confounding.”

Previous studies have shown that EPA and DHA are related to a lower risk of advanced prostate cancer, which was mainly due to DHA and to a lesser extent to EPA.

“LA and AA showed no association with risk of advanced prostate cancer.”

Men that supplemented with 2.5 g fish oil/d had reduced prostate cancer by 11%.

DISCUSSION

“In this large prospective study, we found that ALA from nonanimal sources and ALA from meat and dairy sources were associated or suggestively associated with an increased risk of advanced prostate cancer.” **[IMPORTANT]**

A prior prospective study showed a 2- to 4-fold increased risk of prostate cancer in men with high ALA exposure determined by dietary or blood assessment.

[Quite important for vegetarians]

In this study, ALA was positively related to risk of advanced prostate cancer.

A high intake of EPA/DHA was associated with a decreased risk of total and advanced prostate cancer.

“Fatty acids may modulate prostate carcinogenesis through numerous processes, such as modification of membrane phospholipid composition, alteration of cell signaling and receptor activity, lipid peroxidation, cyclooxygenase inhibition, cytokine production, and interference with androgen activity.”

“Experimental studies show that prostate tumor growth is inhibited by EPA and DHA.”

“In contrast, ALA shows no protective effect on prostate tumor growth in animal models, and ALA can promote prostate cancer cell growth in vitro.”

[Quite important for vegetarians]

“The specific mechanisms underlying why n-3 fatty acids mainly from terrestrial and those mainly from marine sources may have divergent effects on prostate cancer risk are unclear.”

“One possibility is that ALA is less effective than are EPA and DHA in displacing AA from cell membrane phospholipids and in inhibiting prostaglandin synthesis.”

“ALA conversion is limited for EPA and severely constrained for DHA.”

[Again, quite important for vegetarians]

“Another possibility is that EPA and DHA have numerous antiinflammatory properties that have been linked with decreased cancer risk, whereas ALA shows little influence on immune function and inflammatory cytokine production at feasible dietary intakes.” **[Again, quite important for vegetarians]**

“In summary, our results suggest that a high ALA intake is associated with an increased risk of advanced prostate cancer.”

“In contrast, high EPA and DHA intakes may be associated with a decreased risk of total and advanced prostate cancer.”

Because the apparent adverse effect of ALA on risk of advanced prostate cancer may counter the reduction in cardiovascular disease that may be achieved through ALA use, further research for men is imperative.

KEY POINTS FROM DAN MURPHY

- 1) Surprisingly, those who consumed higher amounts of plant derived ALA omega-3 increased their risk of advanced prostate cancer by an average of 202%.
- 2) Those who had higher consumption of animal (meat and dairy) derived ALA omega-3 increased their risk of advanced prostate cancer by an average of 53%.
- 3) Those who consumed higher amounts of EPA and DHA reduced the risk of prostate cancer by between 11% to 26%, with DHA being more effective.
- 4) Alpha-linolenic acid (ALA) is poorly converted to eicosapentaenoic acid (EPA), and even more poorly to docosahexaenoic acid (DHA).

- 5) Numerous studies show that the concentrations of EPA and DHA are high in fish oils and they consistently inhibit tumor cell growth in human prostate tumors.
- 6) The eicosanoid prostaglandin E2 is derived from the omega-6 fatty acid arachidonic acid, and it strongly stimulates prostate tumor growth.
- 7) EPA and DHA inhibit cyclooxygenase-2 and the formation of prostaglandin E2 from AA.
- 8) Higher intakes of EPA/DHA is associated with a decreased risk of total and advanced prostate cancer.
- 9) Prostate tumor growth is inhibited by EPA and DHA, but not by ALA.
- 10) EPA and DHA have numerous antiinflammatory properties that have been linked with decreased cancer risk, whereas ALA shows little influence on immune function and inflammatory processes.

COMMENT:

This information is very important for men of my age group. It is also important for men who are vegetarians and consume higher levels of alpha-linolenic acid from plant sources.