
Omega-3 Fatty Acids and Cancer

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Received: 19 May 2018

Published: 21 May 2018

Keywords: *Cancer Development; Bioavailability; Fatty Acids*

Omega 3 (n3) polyunsaturated fatty acids are found naturally in fish or fish oil and have been extensively studied in multiple inflammatory diseases with improved outcomes, especially in cancer, whereas n3 PUFA appear to modulate cancer progression while n6 fatty acids contribute to cancer development.

Major changes have taken place in the food supply over the last 100 years, which lead to increasing the amount of n6 fatty acids intake from vegetable oils and meat, eggs, dairy, associated with fish consumption decreased, known as Western Diet. This food intake pattern led to a n6/n3 ratio imbalance intake for the first time in the history of human beings since industrial revolution.

Because of the increased amounts of n6 fatty acids in the Western diet, their inflammatory eicosanoid metabolic products, specifically prostaglandins, thromboxanes and leukotrienes are formed in larger quantities than those formed from n3 fatty acids. The eicosanoids from n6 are more biologically active than n3 ones and if they are formed in large amounts, they contribute to promote tumor cell proliferation, survival, migration and invasion.

With a higher n3 intake or supplementation, the replacement of n6 fatty acids in cell membranes by n3 fatty acids is also an important anti-cancer mechanism of action. They can directly influence cancer cells and the tumor environment, and also influence the host response to tumor bearing progression.

Recent systematic reviews have concluded that n-3 fatty acids are protective against different types of cancer, such as colorectal and breast. Lung and prostate cancer is currently under debate. Experimental research showed antitumor effects in gastric and pancreatic cancer cell lines. In an interesting review of the literature Vaughan *et al.* (2013) concluded “There is now sufficient literature to suggest that the use of supplements containing n3 fatty acids may have potential use as an effective adjuvant to chemotherapy treatment and may help ameliorate some of the secondary complications associated with cancer...” Thus, the examination of the interactions of omega 3 FAs intake or supplements with well-known anticancer drugs, could provide better clinical outcomes [1].

Due to the different genetic background and tumor subtypes, type of dietary sources used, fatty acid bioavailability there is still no consensus about fatty acids doses and time of treatment, but recent findings strongly support the use of n-3 fatty acids in cancer prevention and treatment. On the other hand, n-6 fatty acids are often associated with a higher cancer risk, even if their beneficial effects have also been highlighted in some studies.

In conclusion, it is extremely important to continue the discussion about the dietary source, bioavailability, biochemistry and metabolism of omega 3 fatty acids, their potential anticancer molecular mechanisms and possible adverse effects, to guarantee the effectiveness in cancer prevention and treatment.

Bibliography

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