

Omega Fatty Acids in Prostate Cancer – A Review

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ABSTRACT

Prostate cancer is the most common cancer in men. At present radiation therapy, hormone therapy, surgery to remove prostate, freezing prostate tissue, chemotherapy and biological therapy are employed. The best natural dietary sources for omega3 fatty acids shows promising results for the treatment of prostate cancer. This review deals with the uses of omega fatty acids in the treatment of prostate cancer.

Key words: Prostate cancer, Radiation therapy, Hormone therapy, Surgery, Freezing prostate tissue, Chemotherapy and biological therapy, Omega 3 fatty acids.

INTRODUCTION

The American Cancer Society's estimate for prostate cancer in the United States for 2015 is about 1 man in 7 will be diagnosed with prostate cancer during his lifetime. The prostate is a gland found only in males. It sits below the urinary bladder and in front of the rectum. The size of the prostate changes with age. It grows rapidly during puberty, fueled by the rise in male hormones (called androgens) in the body, such as testosterone and dihydrotestosterone (DHT). The prostate usually stays about the same size or grows slowly in adults, as long as male hormones are present. The prostate's make some of the fluid that protects and nourishes sperm cells in semen, making the semen more liquid. Several types of cells are found in the prostate, but almost all prostate cancers develop from the gland cells (the cells that make the prostate fluid that is added to the semen). The medical term for a cancer that starts in gland cells is adenocarcinoma. Other types of cancer can also start in the prostate gland, including sarcomas, small cell carcinomas, neuroendocrine tumors (other than small cell carcinomas), and transitional cell carcinomas.^{1,2}

Symptoms of Prostate Cancer

Problems passing urine, blood in urine, trouble getting an erection, pain in the hips, back, chest or other areas from cancer that

has spread to bones, weakness or numbness in the legs or feet.

Diagnosis of Prostate Cancer

Prostate cancers can be found by screening with a prostate-specific antigen (PSA) blood test and or a digital rectal exam (DRE). Medical history and physical examination, PSA blood test, trans rectal ultrasound (TRUS), prostate biopsy, prostatic intraepithelial neoplasia (PIN), atypical small acinar proliferation (ASAP), proliferative inflammatory atrophy (PIA), Computed tomography (CT) scan, Magnetic resonance imaging (MRI), lymph node biopsy, laparoscopic biopsy, fine needle aspiration.³

Current Treatment for Prostate Cancer

Prostate cancer treatment options depend on several factors, such as how fast the cancer is growing, how much it has spread and the overall health, as well as the benefits and the potential side effects of the treatment. Currently radiation therapy, hormone therapy, surgery to remove prostate, freezing prostate tissue, Chemotherapy and Biological therapy.⁴

Omega 3 Fatty Acids Role and Responsibilities

Omega 3 fatty acids (n-3 fatty acids) are polyunsaturated fatty acids with a double

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bond (C=C) at the end of the carbon chain. Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) come mainly from fish, so they are sometimes called marine omega-3s. Alpha-linoleic acid (ALA), the most common omega-3 fatty acid in most western diets, is found in vegetable oils and nuts (especially walnuts), flax seeds and flaxseed oil, leafy vegetables, and some animal fat, especially in grass-fed animals. The human body generally uses ALA for energy, and conversion into EPA and DHA is very limited. Plant foods contain alpha-linoleic acid and marine animals provide eicosapentaenoic acid and docosahexaenoic acid. Foods that naturally contain high levels of alpha-linoleic acid include canola oil, soybean oil, flaxseed/linseed oil and walnut oil. The best natural dietary sources of eicosapentaenoic acid and docosahexaenoic acid include oily fish such as swordfish, Atlantic salmon, gem fish and Spanish mackerel, oysters. Meats such as beef, chicken and lamb contain smaller amounts of N-3 polyunsaturated fatty acids. N-6 polyunsaturated fatty acids are found in plant-based foods and some animal tissue. Main food sources of N-3 polyunsaturated fatty acids include corn, sunflower, sesame, peanut, soybean, and cottonseed oils, walnuts. N-3 fatty acids play a structural role in cell membranes. Eicosapentaenoic acid incorporated into cell membranes can act as a precursor to a variety of eicosanoids and cytokines that can have widespread effects on the human body. Human body uses alpha-linolenic acid for energy.⁵

Effects of Omega-3 Fatty Acids on Cancer

1. Catherine H. *et al.* published and unpublished evidence to determine estimates of the effect of omega-3 fatty acids on cancer risk in prospective cohort studies.

A large body of literature spanning numerous cohorts from many countries and with different demographic characteristics does not provide evidence to suggest a significant association between omega-3 fatty acids and cancer incidence. Dietary supplementation with omega-3 fatty acids is unlikely to prevent cancer.⁶

2. The Importance of the Omega-6/Omega-3 Fatty Acid Ratio in Cardiovascular Disease and Other Chronic Diseases were studied by Artemis P. *et al.*

Therefore, it is quite possible that the therapeutic dose of omega-3 fatty acids will depend on the degree of severity of disease resulting from the genetic predisposition. A lower ratio of omega-6/omega-3 fatty acids is more desirable in reducing the risk of many of the chronic diseases of high prevalence in Western societies, as well as in the developing countries.⁷

3. Omega-3 fatty acids as cancer chemo-preventive agents were postulated by David P & Roseet al.***

There is both epidemiologic and experimental evidence that the long-chain omega-3 fatty acids (FAs), which occur at high levels in some fish oils, exert protective effects against some common cancers, notably those of breast, colon, and, perhaps, prostate. Multiple mechanisms are involved in this chemo-preventive activity, including suppression of neoplastic transformation, cell growth inhibition and enhanced apoptosis, and antiangiogenicity; however, a common feature of most of these biological effects is the inhibition of eicosanoid production from omega-6 FA precursors. Several of the known risk factors for breast, and colon, cancer may be favorably modified by dietary omega-3 FA supplementation, and the implementation of clinical chemoprevention trials is now feasible.⁸

The effects of omega-3 and omega-6 fatty acids on *in vitro* prostate cancer growth were studied by Pandalai PK, *et al.*

Previous studies have indicated that EPA should inhibit human prostate cancer growth *in vitro*, however the results demonstrated promotion at low concentrations (1ng/ml). At higher concentrations, EPA did inhibit prostate cell growth. These data indicate low levels of dietary fat, regardless of composition, may play a role in prostate cancer proliferation and could be an avenue for therapeutic intervention.⁹

CONCLUSION

From the above review it is revealed that, prostate cancer is the most common cancer in men. Prostate cancer treatment options depend on several factors, one of the treatment approaches is by supplementing natural source of omega fatty acids in the form of fish oil that too in low divided dose. Further research is needed in this topic to clarify doubts regarding the usage of omega 3 fatty acid.¹⁰

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ABBREVIATIONS

DHT: Dihydrotestosterone; **PSA:** Prostate Specific Antigen; **DRE:** Digital Rectal Exam; **TRUS:** Trans Rectal Ultrasound; **PIN:** Prostatic Intra Epithelial Neoplasia **ASAP:** atypical small acinar proliferation

PIA: Proliferative Inflammatory Atrophy; **CT:** Computed Tomography; **MRI:** Magnetic Resonance Imaging; **EPA:** Eicosapentaenoic Acid.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

SUMMARY

Omega 3 fatty acids have many health benefits along them are prevention of heart disease, depression, and various types of cancer including prostate cancer.

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