

You are what you eat: Low fat diet with fish oil slowed growth of human prostate cancer cells

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A low-fat diet with fish oil supplements eaten for four to six weeks prior to prostate removal slowed down the growth of prostate cancer cells -- the number of rapidly dividing cells -- in human prostate cancer tissue compared to a traditional, high-fat Western diet.

Done by researchers at UCLA's Jonsson Comprehensive Cancer Center, the short-term study also found that the men on the low-fat, fish oil supplement [diet](#) were able to change the composition of their cell membranes in both the healthy cells and the cancer cells in the prostate. They had increased levels of omega-3 [fatty acids](#) from fish oil and decreased levels of omega-6 fatty acids from corn oil in the cell membranes, which may directly affect the biology of the cells, though further studies are needed, said Dr. William Aronson, the study's first author and a researcher with UCLA's Jonsson Comprehensive Cancer Center.

The study also found that blood obtained from patients after the low-fat, fish oil diet program slowed the growth of [prostate cancer](#) cells in a test tube as compared to blood from men on the [Western diet](#), which did not slow [cancer growth](#).

"The finding that the low-fat, fish oil diet reduced the number of rapidly dividing cells in the prostate [cancer tissue](#) is important because the rate at which the cells are dividing can be predictive of future [cancer](#)

[progression](#)," Aronson said. "The lower the rate of proliferation, the lesser the chances that the cancer will spread outside the prostate, where it is much harder to treat."

The study appeared Oct. 25, 2011 in [Cancer Prevention Research](#), a peer-reviewed journal of the American Association for Cancer Research.

The study, which evaluated blood samples before and after the diet commenced and examined tissue from the removed prostate, validated previous studies by Aronson and others done on cell lines and in animal models. Aronson said the study using human blood and tissue also proved that the changes prompted by what the men were eating were clearly evident in their prostate tissue - the "treatment" was indeed reaching the targeted organ because of the changes in the prostate cell membrane's fatty acid composition.

"You truly are what you eat," said Aronson, a clinical professor of urology, who also serves as chief of urologic oncology at the West Los Angeles Veterans Affairs Medical Center. "Based on our animal studies, we were hopeful that we would see the same effects in humans. We are extremely pleased about our findings, which suggest that by altering the diet, we may favorably affect the biology of prostate cancer."

Aronson measured proliferation, or the rate of prostate cancer cell division, by staining tissue obtained from the radical prostatectomy specimens with an antibody against Ki-67, a protein involved in the cell-cycle progression and growth.

"The percentage of [prostate cancer cells](#) that stained for Ki-67 was determined by the pathologist, and this gave us an objective measurement of the percentage of cells that were actively dividing and therefore more aggressive," said Aronson. "Previous studies found that patients with higher levels of Ki-67 in their prostate cancer tissue were

more likely to have their prostate cancer progress to advanced stages, and were more likely to die from their prostate cancer. Thus, we are extremely encouraged by our findings that a low-fat diet with fish oil lowered Ki-67 levels and may have the potential to slow the progression of prostate cancer."

Diet studies often are difficult to evaluate because getting patients to comply with dietary changes can be challenging. However, the food eaten by men in both arms of this study was precisely controlled, Aronson said. The meals were prepared by chefs in the UCLA Clinical Translational Research Center and delivered in bulk to study participants several times a week. Participants also met with a dietician, kept food diaries and were required to return uneaten food.

"The key to this study was having the meals prepared and delivered to the study participants," Aronson said. "This resulted in a very high rate of compliance, making the study very well controlled."

The Western diet consisted of 40 percent of calories from fat, generally equivalent to what many Americans consume today. The fat sources also were typical of the American diet, and included high levels of omega-6 fatty acids from corn oil and low levels of fish oil that provide omega-3 fatty acids.

The low-fat diet consisted of 15 percent of calories from fat. Additionally, the men on this diet took five grams of fish oil per day in five capsules, three with breakfast and two with dinner, to provide fish oil omega-3 fatty acids. Omega-3 fatty acids have been found to reduce the incidence of heart disease and fight inflammation, and inflammation has been associated with certain cancers.

"Preclinical studies suggest that lowering dietary omega-6 fatty acids from corn oil and increasing omega-3 fatty acids from fish oil decreases

the risk of prostate cancer development and progression," the study states. "We found this diet intervention resulted in a decrease in omega-6 vs. omega-3 fatty acid ratios in benign and malignant prostate tissue and a decrease in malignant cell proliferation."

Aronson cautioned that he could not recommend dietary changes based on this study because of its short duration and small sample size. However, based on these results he is organizing a much larger study of 100 men with prostate cancers who have elected active surveillance, meaning they're not getting any treatment for their disease but are getting regular biopsies and check-ups.

The future study will randomly divide the men into a low-fat, [fish oil](#) supplement group and a traditional Western diet group and follow them for a year to evaluate the diet effects on prostate cancer proliferation.

Provided by University of California - Los Angeles

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