Fish Oil and Prostate Cancer

Help or Harm?

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In 2013, you may have seen some striking headlines about fish oil that made it into the popular media. Statements like “Link between omega-3 fatty acids and increased prostate cancer confirmed” in Science Daily, and “Men who take omega-3 supplements at 71% higher risk of prostate cancer” in the New York Daily News. This was quite alarming to members of the public who were supplementing with fish oil. However, a systematic review—a summary of all of the research on this topic—was recently published providing the most thorough and up-to-date evaluation of this topic including the results of 54 journal articles.[1]

The topic of how diet affects prostate cancer has been a topic of interest for a while. It is known that the risk of prostate cancer varies dramatically based on geographic location—in some places, the risk is 60 times higher than others! And when people relocate from a low-risk country to a high-risk one, their risk actually increases. This suggests that a diet or lifestyle factor may be heavily involved.[2] Populations with the highest intake of fish (including Japanese and Alaskan Inuit) have lower rates of prostate cancer than individuals eating a Western diet, so fish became a topic of interest.[2]

Two types of research studies are used to evaluate this topic. Observational studies measure how much fish oil people are taking in by their own choosing and look for relationships with whether or not these individuals develop prostate cancer. Interventional studies give people a specific amount of fish oil and look for an impact on prostate cancer. While the observational studies give researchers clues of where associations might exist, interventional studies are needed to confirm that a food definitely causes a harmful or protective effect.
Now what’s wrong with those headings that the media used to grab readers’ attention? The study that it was reporting on was an observational study, not a high-quality intervention study that is needed to make such strong cause-and-effect conclusions as seen in the headlines. As well, the study did not give the men any fish oil—it attempted to measure how much the men were getting naturally through their own diet choices. But it didn’t actually measure intake. It measured the amount of omega-3 fatty acids in the blood, and made the assumption that this reflected the amount that people were taking in. But it was not able to tell if the men were getting omega-3 fatty acids from their diet or from supplements (another thing that’s wrong with those headlines!). Observational studies can detect an association between higher blood levels and prostate cancer, but it can’t tell if the fish oil caused the prostate cancer. For example, maybe men with prostate cancer are more likely to make healthy choices after a prostate cancer diagnosis and start eating more fish which caused their blood levels of omega-3s to increase. Or maybe men with prostate cancer process fish oil in a different way, resulting in higher blood levels. These are examples of how the higher blood omega-3s might be an effect of prostate cancer and not a cause—observational studies often can’t make this distinction. Additionally, there are a host of other issues with measuring blood levels which will be discussed. But as you can see, the conclusions drawn by the media were not appropriate. In this article, we will review the entire body of scientific evidence on this topic to get a more accurate idea of what is currently known.

Intervention Studies
These studies give fish oil to individuals and look for an effect on prostate cancer. They play a crucial role in research in order to confirm a cause-and-effect relationship. Unfortunately, the number of interventional studies on this topic was small. Four studies gave fish oil supplements to men who had prostate cancer. None of the studies found a change in prostate serum antigen (PSA)—a blood test used to monitor the progression of prostate cancer. Some of the studies found that the fish-oil supplement caused a decrease in inflammation as well as improvement in other blood tests used to monitor prostate cancer progression. These studies were limited by their short length—most were a few months in length, which is not a long time when observing a condition like prostate cancer, which most often changes slowly over a period of years. Also, they only assessed the progression of prostate cancer; they did not look at how giving fish-oil supplements to healthy men affected their risk of developing prostate cancer in the future.
Observational Studies

The number of studies that looked for relationships between fish intake and prostate cancer were larger: 49 articles described these findings. There were several types of observational studies used; some assessed the diets of men and then followed them over time (these are called cohort studies), and some compared men with prostate cancer to men without prostate cancer by asking them to recall how much fish they ate in the past or measuring their blood levels of fish oil in order to estimate how much fish they typically eat (these are called case-control studies). Cohort studies are considered to be higher-quality than case-control studies. Also, some looked at the risk of developing prostate cancer among healthy men, and some looked at the risk of disease progression and death among men who already had prostate cancer.

In the cohort studies that looked at the risk of developing cancer, most of the studies showed no relationship. Five studies showed a relationship between more fish intake and lower risk, while three studies showed a relationship between more fish intake and higher risk. In contrast, the cohort studies that looked at the risk of dying from prostate cancer were more in agreement. Five studies showed a significant decrease in the risk of dying from prostate cancer with higher fish intake, and the remaining two showed a small decrease in risk that was not large enough to be statistically significant.

The case-control study results were more variable, with a mixture of results suggesting either a protective effect, a harmful effect, or no effect. These studies had many limitations, most significantly the ability to accurately assess how much fish oil the study participants had been exposed to. Some of these studies used a questionnaire that asked participants to recall the amount of a food that they ate at a previous time point, often several years prior. The accuracy is limited by intentional recall errors (participants may feel judged and report inaccurate information) or unintentional recall errors (remembering food patterns from 10 years ago can be very difficult!). Some of the studies used blood analysis instead of the questionnaire—they measured the amount of omega-3 fatty acids present. However, this has limitations as well. The blood analysis provides information about how much omega-3 fats the person has been eating recently (days to months at the most, depending on the test), but cancer develops over many years. As well, individuals metabolize fats differently, so two people eating the same amount of omega-3 fats may have different blood levels, making interpretation difficult.[1]
Possible Mechanisms and Conclusions

When considering if a risk factor may be associated with an increased or decreased risk of a disease, it’s important to consider how this might occur; in other words, the mechanism of action.

In terms of a possible protective effect, many mechanisms have been proposed. The omega-3 fatty acids in fish oil decrease inflammation, which improves the immune system’s ability to kill cancer cells. Animal studies—although preliminary—have also shown that omega-3 fats slow the growth of tumours, decrease metastasis, and enhance the effects of chemotherapeutic drugs. In a preliminary review of these animal and cell studies, 50 of 51 studies showed the omega-3 fats having an anticancer effect.\cite{1}

In terms of how fish oil might increase the risk of prostate cancer, no biological mechanism has been suggested. It is possible that the results described above are related to the type of study used—those suggesting an increased risk were more likely to be case-control studies, which are considered to be lower-quality studies and less accurate at detecting relationships.\cite{1} One study suggested that the relationship between omega-3 and omega-6 intake may be more relevant than looking at omega-3 alone. Omega-6 fats have proinflammatory effects, the opposite of omega-3s, so looking at both may give a more accurate idea of how fats are impacting the inflammation levels in the body.\cite{4}

Additionally, the vast majority of the observational studies (the studies that just observed how much omega-3 fatty acids people were taking in) looked only at the amount of fish people were eating and not at fish-oil supplements. As a result, the effects seen may be related to the fish oil or any other component found in fish. Fish are known to contain many environmental contaminants that impact the hormonal system and could therefore affect cancer risk. As well, the cooking process may be relevant; a study that separated fish intake by its method of preparation found that fish cooked to “well done” or “very well done” or at high temperatures was associated with an increased risk of prostate cancer, while fish cooked to “just done” or at low temperatures was not.\cite{5}

In conclusion, the current research does not allow us to draw any firm conclusions about the relationship between fish oil and prostate cancer. We cannot say that it increases or decreases the risk of developing this illness. The observational studies suggest that there may be a relationship between higher intake of fish and a decreased likelihood of dying from prostate cancer, but this needs further investigation using high-quality study types. Overall, the concerns expressed by the media are not valid, and there is some reason to think that fish intake may be helpful; however, more research is needed to fully understand this relationship.
References


