



# Omega-3 Fatty Acids & Prostate Cancer Risk

©2013 Huntington College of Health Sciences

Literature Education Series On Dietary Supplements

By Gene Bruno, MS, MHS ó Dean of Academics, Huntington College of Health Sciences

*Smart Supplementation™ is a free series of educational literature created by Huntington College of Health Sciences (HCHS) as a public service. Although copyrighted, it may be freely photocopied and distributed, but may not be altered in any way. Smart Supplementation™ is not intended as medical advice. For diagnosis and treatment of any medical condition, consult your physician.*

According to a prospective study published in the *Journal of the National Cancer Institute* (JNCI),<sup>1</sup> a high intake of long-chain omega-3 fatty acids from foods and supplements could increase the risk of developing aggressive prostate cancer by 71%. So does this mean that men should stop eating fish and supplementing with fish oil supplements? No, it most assuredly does not. Let's take a closer look at the study.

## The type of study

First of all, it should be noted that this JNCI study was a caseócohort study in which data was examined from a different study (The Selenium and Vitamin E Cancer Prevention Trial). This is significant because that means that this observational study was *not* designed to investigate the role of omega-3s in prostate cancer. Consequently, there are many factors which could interfere with an accurate assessment of the data. In fact, a NutraIngredients article quoted Dr Michèle Sadler, scientific adviser to the Health Food Manufacturers' Association (HFMA), as making the following comment about the JNCI study: "no firm conclusions can be drawn." "This type of evidence can indicate an association, but does not demonstrate cause and effect."<sup>2</sup>

## Conflicting data

NutraIngredients also quoted experts from GOED (the Global Organization for EPA and DHA Omega-3s) as saying that if the findings of the new study were true, "then prostate cancer would be rampant in any country with high seafood consumption (Scandinavia, Japan etc) and conversely, low level consumption should be protective." "Clearly this is not the case."<sup>2</sup> Likewise, in speaking to NutraIngredients, Duffy MacKay, vice

president of scientific and regulatory affairs for the Council of Responsible Nutrition (CRN) indicated that in addition to the correlation found between omega-3 plasma levels and the risk of prostate cancer in the JNCI study, there were also several other 'significant correlations' from the study that did not make sense when put against the background of scientific evidence.<sup>2</sup>

"If you look at the data ... It appears that the non-smokers had more aggressive prostate cancer. It appears that non-drinkers, or people who drank less than one alcoholic drink at baseline, were at a higher risk of prostate cancer. So that just shows how carefully we have to deal with these sorts of statistical exercises where we take numbers from old studies and try to make heads or tails of that." "If you listen to this study, you should not only cut omega-3 but you should start smoking cigarettes and drinking more."<sup>2</sup>

Furthermore, the GOED indicated that the difference in mean blood plasma fatty acids levels for omega-3s between the groups was small - 4.66% in the combined cancer group versus 4.48% in the control. This means that the JNCI study is basing their results on just 0.2% difference in omega-3 levels.<sup>2</sup> According to MacKay, "This change [of 0.2%] literally could have occurred if somebody ate a fish sandwich on their way to get their blood drawn," he said, "These levels are not astronomically high levels. Therefore any country that has a diet based on fish ... would have incredibly high levels of aggressive prostate cancer, and we know that's not the case." "It's a tiny and insignificant difference in plasma levels, which is linked to a 71% increase in cancer. And that's just a red flag."<sup>2</sup>

## Fish and fish oil

Another point of contention is that the authors of the JNCI study suggest that omega-3 fish oil supplements can be harmful. However, at no point in the study did they ever indicate the elevated serum levels of omega-3 fatty acids found in subjects a result of supplementation with fish oil. It is more likely that the consumption of

actual fish was the source. This brings into question the motivation of the authors in drawing conclusions about fish oil supplements.

Even if the results of the study actually showed a true association with regard to increased prostate cancer risk, it may have nothing to do with the omega-3 fatty acids themselves. While the fish being eaten provided omega-3 fatty acids, they may also have provided polychlorinated biphenyls (PCBs) a common occurrence.<sup>3 4 5 6 7 8</sup> This is significant since research suggests that PCB exposure may increase the risk of prostate cancer.<sup>9 10</sup>

As a point of interest, the Food and Drug Administration's (FDA) tolerance level for PCBs in fish is 2,000 ng/g or 2,000 ppb. By contrast, high quality, processed fish oil pass the test for California's Prop 65 stringent requirements for PCBs (90 ng/g or 90 ppb). In fact, they also pass the PCB limits test of Belgium, Canada, Germany, Sweden and The Netherlands.<sup>11 12</sup>

### Other studies on fish oil and prostate cancer risk

Given that the JNCI study was observational in nature and not designed to examine prostate cancer risk, have there been other studies that were designed to do just that? Yes, there were. In fact, a 2013, randomized, double-blind, placebo-controlled trial published in the *British Journal of Nutrition* found that daily supplementation with EPA omega-3 fish oils significantly reduced prostate-specific antigen (PSA) levels (P= 0.004), a measure of prostate cancer risk. In addition, a 2011 phase II prospective randomized trial published in *Cancer Prevention Research*<sup>13</sup> found that a low-fat diet with fish oil supplementation decreased prostate cancer proliferation. Another case-control study published in *Clinical Cancer Research*<sup>14</sup> found that dietary intake of omega-3 fatty acids was strongly associated with a decreased risk of aggressive prostate cancer (P=0.0001).

### Conclusion

Don't stop taking omega-3 fatty acid fish oils for fear of increasing the risk of prostate cancer. The JNCI article was flawed, and other research suggests that omega-3 fatty acid fish oils may actually play a protective role in prostate cancer prevention.

### References

- <sup>1</sup> Brasky TM, Darke AK, Song X, et al. Plasma Phospholipid Fatty Acids and Prostate Cancer Risk in the SELECT Trial. *J Natl Cancer Inst.* 2013; published online ahead of print, doi: 10.1093/jnci/djt174
- <sup>2</sup> Gray N. High levels of long chain omega-3 may increase prostate cancer risk: Study. *Nutraingredients-USA.* 11-Jul-2013. Retrieved July 12, 2013 from <http://www.nutraingredients.com/Research/High-levels-of-long-chain-omega-3-may-increase-prostate-cancer-risk-Study>.
- <sup>3</sup> Boix J, Cauli O. Alteration of serotonin system by polychlorinated biphenyls exposure. *Neurochem Int.* 2012 Jun;60(8):809-16.

---

<sup>4</sup> Haarstad K, Bavor HJ, Mæhlum T. Organic and metallic pollutants in water treatment and natural wetlands: a review. *Water Sci Technol.* 2012;65(1):76-99.

<sup>5</sup> Crinnion WJ. Polychlorinated biphenyls: persistent pollutants with immunological, neurological, and endocrinological consequences. *Altern Med Rev.* 2011 Mar;16(1):5-13.

<sup>6</sup> Letcher RJ, Bustnes JO, Dietz R, Jenssen BM, Jørgensen EH, Sonne C, Verreault J, Vijayan MM, Gabrielsen GW. Exposure and effects assessment of persistent organohalogen contaminants in arctic wildlife and fish. *Sci Total Environ.* 2010 Jul 1;408(15):2995-3043.

<sup>7</sup> Bidleman TF, Helm PA, Braune BM, Gabrielsen GW. Polychlorinated naphthalenes in polar environments—a review. *Sci Total Environ.* 2010 Jul 1;408(15):2919-35.

<sup>8</sup> Beyer A, Biziuk M. Environmental fate and global distribution of polychlorinated biphenyls. *Rev Environ Contam Toxicol.* 2009;201:137-58.

<sup>9</sup> Ruder AM, Hein MJ, Hopf NB, Waters MA. Mortality among 24,865 workers exposed to polychlorinated biphenyls (PCBs) in three electrical capacitor manufacturing plants: A ten-year update. *Int J Hyg Environ Health.* 2013 Apr 30. pii: S1438-4639(13)00060-6. doi: 10.1016/j.ijheh.2013.04.006. [Epub ahead of print]

<sup>10</sup> Zhu Y, Kalen AL, Li L, et al. Polychlorinated-biphenyl-induced oxidative stress and cytotoxicity can be mitigated by antioxidants after exposure. *Free Radic Biol Med.* 2009 Dec 15;47(12):1762-71.

Zhu Y, Kalen AL, Li L, et al. Polychlorinated-biphenyl-induced oxidative stress and cytotoxicity can be mitigated by antioxidants after exposure. *Free Radic Biol Med.* 2009 Dec 15;47(12):1762-71.

<sup>11</sup> European Commission Report on non-dioxin-like PCBs; 2003. <http://www.inspection.gc.ca/english/anima/fispoi/guide/chme.shtml>

<sup>12</sup> Aronson WJ, Kobayashi N, Barnard RJ, et al. Phase II prospective randomized trial of a low-fat diet with fish oil supplementation in men undergoing radical prostatectomy. *Cancer Prev Res (Phila).* 2011 Dec;4(12):2062-71.

<sup>13</sup> Fradet V, Cheng I, Casey G, Witte JS. Dietary omega-3 fatty acids, cyclooxygenase-2 genetic variation, and aggressive prostate cancer risk. *Clin Cancer Res.* 2009 Apr 1;15(7):2559-66.