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## Is Atlantic Salmon (Farmed Salmon) Linked to Obesity and Diabetes?

Rates of diabetes are climbing at an alarming rate. Across the world, the rates of the development of diabetes are dramatically increasing. In 2000, [an estimated 2.8 percent](#) of all persons in the United States had been diagnosed with diabetes (171 million), and it was predicted to hit 4.4 percent by 2030 (366 million persons). But, because the rates were increasing so fast, by 2010, the [estimated rate of diabetes for 2030](#) was increased to 6.4 percent of all persons (439 million). The prevalence of adult obesity in the U.S. has also risen dramatically over the last three decades to [more than 35 percent](#). Medical costs of obesity reached \$147 billion per year in the U.S. in 2008 and accounted for up to [16.5 percent of medical care costs](#).

The commonly-accepted risk factors for Type 2 diabetes (T2DM) include: obesity, sedentary lifestyle, poor diet, family history of diabetes, race/ethnicity, age, a history of gestational diabetes and metabolic syndrome. Metabolic syndrome, often considered a precursor to T2DM, is characterized by the presence of at least three of the following: central obesity, impaired fasting glucose, high blood pressure, low high-density lipoprotein cholesterol values and high triglycerides. As the rates of T2DM have been rising, the public continues to hear messages about the importance of better nutrition and regular exercise to help combat this disease. Michelle Obama, the first lady of the United States of America, has begun a campaign to help people get healthier and lose weight in order to reduce diabetes rates. But will that work?

I authored a recent article in the *Journal Alternative Medicine Review* that showed the clear links between environmental toxicants and diabetes and obesity, as well as the clear implication of the consumption of farmed salmon in these health problems. References to all of the studies mentioned below can be [found in this article](#).

The environmental toxicants with the clearest links to the development of obesity, metabolic syndrome and diabetes are the polychlorinated biphenyls (PCBs) and the chlorinated pesticides. These compounds are all referred to as persistent organic pollutants because they tend to persist in one's body and continue to build up over time. Studies from Japan and the U.S. have shown that persons with higher PCB levels have a risk of blood sugar problems that are five to eight-fold higher than people with lower PCB levels. The same toxicants can increase one's risk of developing Type 2 diabetes by factors of two to twelve-fold.

One of the obvious things to point out would be that these persistent pollutants, PCBs and the chlorinated pesticides, have been banned for use in the last few decades, during the same time frame that these diseases have started to rise. So, how could these toxicants be linked to the increasing rates of these health problems? They could only be linked if the general population was still being exposed.

So, the next question would be: Is there a current common source of PCBs and chlorinated pesticides for the average U.S. resident?

The greatest source of exposure to these compounds is from farmed salmon (*Salmo salar*). Several studies have revealed that farmed salmon has exceptionally high levels of PCBs and the chlorinated pesticides. Further research revealed that the toxicant levels in the fish correlated directly with the toxicant levels in the fish food that they were fed, with the most toxic feed and fish coming from the area around Scotland. Dr. Ronald Hites did some of these excellent studies, including one in which he compared the PCBs in Alaskan wild salmon with those from farmed salmon. The wild salmon had lower levels of total PCBs, but the PCBs they had were more water soluble and far less toxic. The farmed salmon had far higher levels of PCBs that were less water-soluble and much more toxic.

But, are these toxicants linked to diabetes?

The mechanism appears to lie in the mitochondria (the energy producers) of each cell. It has been known for some time that adult-onset diabetes and obesity (along with fatigue, cognitive problems and congestive heart failure) are due to mitochondrial dysfunction. All of the persistent toxicants (PCBs and chlorinated pesticides) are powerful mitochondrial poisons.

Is there any association between eating Atlantic salmon and developing diabetes?

The high intake of farmed salmon began in the 1980s after information was published in the *New England Journal of Medicine* revealing that if one was to eat fish weekly, then one's risk of heart disease could be [cut by 50 percent](#). This is a very low cost and pleasant form of health insurance against one of the two major killers today (heart disease). Besides the fact that the rise in the amount of farmed salmon consumed in the U.S. over the last few decades is mirrored by the increase in diabetes, a few interesting and damning studies have recently been published.

A study of the Mohawk tribe found an association between fish consumption, persistent pollutant levels and Type 2 diabetes, so we know that eating fish high in these toxicants can lead to this disease. But recently a rat study specifically looked at farmed salmon to see if it had a link to diabetes. All the rats in this study were fed either one of three high fat diets or a control diet of regular rat chow. One of the high fat diets had corn oil added, the second had Atlantic salmon oil added, while the third added Atlantic salmon oil from which the persistent toxicants were removed. Not surprisingly, the rats supplemented with non-purified Atlantic salmon oil gained weight became insulin resistant and developed fatty-liver disease. The other rats did not. This was quite surprising, since a study published a couple of decades earlier showed that fish oil supplementation prevented the development of blood sugar problems in rats.

Another rodent study fed mice one of several different diets for eight weeks and monitored their health outcome in relation to weight and blood sugar control. Those not on a control diet were fed either a high fat diet, a high fat diet with farmed Atlantic salmon, a Western diet or Western diet with Atlantic salmon. Another group was fed a high fat diet with Atlantic salmon from which the PCBs and chlorinated pesticides were removed. Those mice fed the contaminated salmon fillets developed exaggerated insulin resistance, visceral obesity and glucose intolerance. They also experienced a reduction in muscle glucose uptake in response to insulin. The mice fed the high fat diet with toxin-reduced salmon did not have these adverse health effects.

It should be noted that it did NOT take a long time for these rodents to develop obesity and blood sugar problems after starting to consume the toxic salmon. The persistent toxicants will

lead to a very rapid poisoning of the mitochondria, and since they are persistent will stay in the body for a long time. In fact, they are so persistent that the PCBs you get from one meal of farmed salmon will not be fully cleared out of the body for between 50 and 75 years.

How can you tell if you are getting farmed salmon or wild Alaskan salmon?

All Atlantic salmon is farmed, so if it is labeled on the menu as Atlantic salmon or simply "salmon" you know it is farmed. Other names for farmed salmon that have been used on menus include Norwegian, BC (British Columbia) or Chilean salmon. The best way that I have found to distinguish between farmed salmon and wild Alaskan or Pacific salmon is to simply ask the waitperson, chef or the seller what species the salmon is. Atlantic salmon is only one species -- *Salmo salar*. But Alaskan/Pacific salmon has several species typically referred to as: Kings, Reds, or Silvers (also called Chinook, Sockeye or Coho). If they cannot identify the fish in question as one of those three, then my advice is to choose a different entre.

The next question might be: What about other farmed fish? Aren't they all fed the same fish food?

Unfortunately, I do not have the answer to that very important question. I am hoping that some of these researchers will begin to test other farmed fish for the same toxicant presence.

I love to eat Alaskan red (Sockeye) salmon, and try to have it once weekly. But, I would highly recommend that you think long and hard before consuming farmed salmon -- at least until they figure out how to provide feed that is not loaded with these persistent toxicants.

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