

Watching What You Eat - The *Trans* Fat Story

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INTRODUCTION

The world is moving towards increased awareness about healthy living. Almost on a daily basis we are bombarded with information about the ideal diet: what is healthy, what food is good or bad. Most consumers, however, are still confused about nutrition and the role of food in causing or preventing diseases. Food is not only a source of energy and tissue replacement; it provides one of the pleasures in life and plays an important role in every culture.

Consumers rightly want to make informed food choices. It makes sense to have companies provide information about proven health risks: *trans* fatty acids (TFA) in foods being an example.

The United States Food and Drug Administration ruling, which took effect in January 2006, requires food companies to list the amount of *trans* fats on the nutrition label of every package. Denmark has taken a bolder step by banning food products containing more than 2% TFA. Canada's House of Commons has passed a law to limit TFA in all food products. As a result, most companies have switched the fats they use so they can say *no trans fats on the label*.

WHAT ARE *TRANS* FATTY ACIDS?

Highly unsaturated oils (those with high levels of linoleic and linolenic acids) are liquid at room temperature. They need hydrogenation for two reasons:

- to *harden* the oil for use in solid applications; and

- to *stabilize* the oil because highly unsaturated oils are susceptible to oxidation.

Hydrogenation is a chemical process where hydrogen is added to the oil at high temperatures and pressure in the presence of a catalyst, to reduce the unsaturation (double bond) in the carbon chain. This, in effect, is the artificial way to saturate the oil by converting the polyunsaturated acids into the less unsaturated and saturated acids. The resultant hydrogenated oil becomes *harder* and more stable. Such oil can then be used for solid application. It can also resist turning rancid for a longer period of time.

When the oil is hydrogenated, not all the polyunsaturated acids are converted into the desired less unsaturated and saturated acids. Inevitably, some end up as TFA. The *trans* in TFA refers to the geometric configuration of the fat molecule. Natural polyunsaturated fatty acids in vegetable oils have a *cis* conformation: the hydrogen

atoms in each double bond are on the same side. But the process used in partial hydrogenation results in some double bonds with a *trans* conformation: hydrogen atoms on opposite sides of each double bond. This different *structural arrangement*, which is the result of hydrogenation, has serious effects on nutrition. Studies have raised serious concerns about the negative health effects of high dietary intakes of TFA.

TRANS FATS IN FOOD PRODUCTS

The heated debate between butter and margarine which has been ongoing for decades is misdirected. Unlike most earlier assumptions, margarine has subsequently been shown to be more harmful, due to the presence of partly hydrogenated fatty acids. While this does not endorse butter, a saturated fat, as the healthier option, it shows the need for consumers to be more discerning of the fat content of all the foods they eat, whether within or outside the home.

When comparing the damage potential of *trans* fats and saturated fats to the heart, it is *trans* fats which have been shown to cause greater damage. Similar to saturated fats which damage arteries and raise the harmful LDL cholesterol, *trans* fats also reduce the beneficial HDL cholesterol which saturated fats do not. On the other hand, butter is not a healthy alternative because

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the quantum of its saturated fat far outweighs the *trans* fat in traditional stick margarines. Butter also contains cholesterol, which can raise blood levels of cholesterol in some people; margarine, which is made from vegetable sources, does not.

While consumers may feel protected by FDA's new ruling to label *trans* fats, companies can bypass this regulation simply by changing the fats they use. Furthermore, consumers who use the *no trans fat* label proclamation as their buying guide can still end up buying a lot of food with no beneficial nutritional value. And the FDA ruling does not apply to foods sold in restaurants, bakeries, takeout and other retail food outlets where unsuspecting individuals can still be consuming large quantities of harmful *trans* fats. Aware of this loophole, the New York Department of Health and Mental Hygiene was prompted in March 2006 to ask the city's 20 000 restaurants and 14 000 food suppliers to eliminate partly hydrogenated oils from kitchens and provide foods and food products free of industrially produced *trans* fatty acids.

A comparison of studies between 1983 and 1990 by two US government agencies showed that the average American's consumption of *trans* fat a day has reduced from 8 g to 5.8 g. In the former study, 85% of the amount came from foods containing partly hydrogenated oils while the rest was naturally present in meat and dairy products. The more recent estimate by the FDA confirmed the average *trans* fat consumption by adults at 5.8 g a day. The main contributors of these fats were cakes and related products (23.8%), margarine (16.5%) cookies and crackers

(9.8%), fried potatoes (8.3%) chips and snacks (4.8%) and household shortenings (4.3%).

While the new food label regulation exempts products with less than 0.5 g of *trans* fatty acid per serving, which is considered to be equivalent to zero per serving, it does not remain so if multiple servings of the food are consumed. In fact, the amount of *trans* fat consumed can have a significant effect. The only means to protect against this and be sure that a zero listing means exactly that, is to check the ingredients list. The presence of partly hydrogenated oil is always an indicator of *trans* fat in the food. The only safe way of protecting against consuming *trans* fat is to check the label and ensure that neither *trans* fats nor partly hydrogenated oils are contained in the food.

NEW RESEARCH FINDINGS ON TFA

The latest health concerns about *trans* fats go far beyond the effects on blood cholesterol. It has been recently demonstrated that *trans* fats in addition to raising the bad LDL-cholesterol and lowering the good HDL-cholesterol, can also increase blood levels of triglycerides and lipoprotein (a), which raise cardiovascular risk.

Trans when compared to *cis*-unsaturated fats, also raise blood levels of substances like C-reactive protein that are markers of inflammation and cellular dysfunction, also linked to heart and blood vessel disease. *Trans* fats can also interfere with the metabolism of essential fatty acids, the synthesis of healthful omega-3 fatty acids and the balance of prostaglandins, disrupting protection against blood

clots. High intakes of *trans* fats may also cause insulin resistance, a marker of type 2 diabetes.

In a recent review in the *New England Journal of Medicine* on the relationship between *trans* fats and heart disease, even low levels of *trans* fats in the diet - a small 1% to 2% calories per day - were linked to a substantially increased risk of heart disease. In a study involving 140 000 individuals, consuming 2% calories as *trans* fats resulted in a 23% increase in heart disease.

The effect of TFA in the development of mammalian fetuses, especially that of humans is of current interest. Mammalian fetuses, including humans, are mostly essential fatty acid (EFA) deficient at birth. If the availability of *trans* fatty acids to the human fetus or neonate is enhanced, EFA efficiency is likely to be greatly amplified and can potentially interfere in the normal growth and development of the fetus. There is now some evidence that the placenta discriminates against TFA. Moreover, it has been observed that there exists a significant correlation between low birth weight in premature infants and the high TFA content in their plasma whereas such a relationship was not apparent in normal term infants. This situation is becoming relatively more common and is especially relevant to the low birth weight of babies observed in India, Pakistan and other countries where consumption of TFA is high.

PALM OIL - A SUITABLE ALTERNATIVE

Food manufacturers around the world are working hard to develop alternative methods of producing shelf-stable vegetable oils. Denmark

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has shown that eliminating partly hydrogenated vegetable oils from food sources in stores and restaurants does not result in a loss of palatability, availability or quality, or an increase in cost or consumption of saturated fats. The saturated fatty acids and the structure of the triacylglycerols confer upon palm oil physical properties that allow it to be included in products with minimal hydrogenation. Utilizing palm oil in such situation could virtually eliminate their TFA in the products. We are optimistic that palm oil will be shown to be a highly desirable and nutritive edible oil that will

continue to be sought after as a replacement for hydrogenated oils containing TFA in a wide variety of food formulations.

In the meanwhile, it would be highly prudent and healthy to reduce the consumption of hydrogenated fats.

RECOMMENDED READING

ASCHERIO, A (2006). *Trans fatty acids and blood lipids. Atherosclerosis Suppl.*, 7: 25-7.

MOZZAFARAIN, D (2006). *Trans fatty acids - effects on systemic inflammation and endothelial*

function. Atheroscler Suppl., 7: 29-32.

MOZZAFARIAN, D; KATAN, M B; ACHERIO, A; STAMPFER, M J and WILLET, W C (2006). *Trans fatty acids and cardiovascular disease. New England Journal of Medicine*, 354: 1601-13.

WILLET, W C (2006). *Trans fatty acids and cardiovascular disease-epidemiological data. Atheroscler Suppl.*, 7: 5-8.