The Trans Fat Dilemma:

HELPING YOU MAKE THE HEALTHY CHOICE

INTRODUCTION

WHAT ARE TRANS FATTY ACIDS AND HOW DO THEY OCCUR?

Trans fatty acids (TFA) are produced when oils and fats containing unsaturated fatty acids are subjected to a chemical reaction that requires hydrogen in the presence of a catalyst. Hence the name hydrogenation and this process primarily increase the melting range of the liquid oils and thereby enable their incorporation into many solid fat formulations such as margarine, bakery and frying fats. When an unsaturated fat or oil is fully hydrogenated, all the unsaturated fatty acids are converted into their saturated fatty acids and no trans will be apparent. Partial hydrogenation, results in the formation of TFA. These are capable of imparting physical properties required for the production of solid fats. Thus partial hydrogenation of liquid oils has been the tool of choice for food industry for more than 50 years. Partial hydrogenation actually results in upwards of 20 different isomers of such fatty acids. Small amounts of TFA occur naturally in dairy fat (butter) and meat as a result of bio-hydrogenation in the fore stomach of ruminant animals. TFA are present in foods containing traditional margarines, bakery and frying fats, vegetable shortenings, and vanaspati (vegetable ghee). They are widely distributed in the foods we consume. Estimates of trans consumption are very varied and in many countries this has been hampered by a lack of an accurate database to reflect their contents in common foods.
WHAT ARE THE NUTRITIONAL CONSEQUENCES OF TRANS FATTY ACIDS?

Since their introduction into the human diet and until the early 1990s, partially hydrogenated fats containing TFA were advocated as the preferred fatty acid base for solid fats, especially margarines. They were initially designed to replace butterfat. With advancements in our knowledge about the potential adverse effects of saturated fatty acids (SFA) on cardiovascular disease (CVD) risk, TFA were made prominent as a safe alternative. Similar to other common fatty acids, TFA are efficiently absorbed and digested in humans. They are also readily incorporated into human tissues and organs just like other (natural) fatty acids.

Research, especially from the past two decades has unequivocally established the dangers from consumption of foods containing trans fatty acids. The spectrum of adverse effects, first thought to be just confined to coronary heart disease risk, has now expanded to include increased risk for a number of other disease including diabetes. Trans may also impact obesity and adversely affect normal fetal development in pregnant women. As a result, expert panels have not only recommended labeling TFA but are working towards their elimination from the food supply. Zero trans consumption is thus advocated.

The landmark Dutch study of Mensink and Katan in 1990 suggested that trans increased total and low-density lipoprotein cholesterol (LDL-C) and decreased the beneficial high-density lipoprotein cholesterol (HDL-C) resulting in increased heart disease risk. Nearly a dozen other studies quickly fortified this finding, almost all reflecting increases in LDL-C and decreases in the beneficial HDL-C following the consumption of a TFA diet. Inevitably it was established that TFA could be worse than the saturated fats they were designed to replace in the first instance. The Harvard Nurses’ Health Study elucidated the effects of TFA using population data from 85,095 women, establishing an association between TFA and incidence of coronary heart disease (CHD). Foods that were major sources of trans containing margarines and cookies revealed a positive correlation. These studies clearly established an association of TFA consumption with increased incidence and death from CHD and it was estimated that each year almost 80,000 deaths in the United States alone were associated with continued consumption of foods rich in TFA. Recent studies have implicated TFA not only with CHD but also with increased risk and incidence of diabetes, obesity and potential adverse outcomes on sudden cardiac death (cardiac arrhythmia).

In pregnant women, fetus development may be compromised since TFA compete with essential fatty acids during fetal development. Based on these findings and a review of all available scientific literature relating to TFA, the Institute of Medicine (IOM) of the National Academies of Sciences, USA declared that there are no data available to indicate a health benefit from consuming TFA. Resulting from this expert recommendation and the mounting evidence against TFA, there is currently an urgent race to eliminate trans and reformulate many solid fats as TFA-free.

CAN YOU FIND ALTERNATE NATURAL FATS THAT ARE TRANS FREE AND HEALTHY?

Deep-frying is an important food preparation/processing method practiced universally. For deep-frying purposes the oil or fat should have low polyunsaturates, which tend to oxidize very rapidly. Commercial frying operations prefer to use solid fats rather than liquid oils, primarily to minimize oxidation of the oils and to extend the shelf life of the fried products. Interestingly, very few of the polyunsaturated oils (corn, soy, sunflower) can be used for industrial frying. The common approach has been to partially hydrogenate such liquid oils but this results in trans. Current preference is to choose oils that are heat stable such as palm olein, which have been shown to better withstand oxidation during industrial frying operations. Another common alternative is to blend unsaturated vegetable oils with palm olein to reduce the overall polyunsaturated content and confer greater stability to such blends.

Shortenings, including bakery fats are used extensively in the food industry. Originally intended as a replacement for lard, partially hydrogenated fats became a mainstay in most shortening formulations. An important function of a shortening is its ability to incorporate and then hold air when beaten in a cake batter or creamed with sugar. The trapping of air increases volume of the cream and the baked product. Shortenings also contribute to fabrication and give the dough the required final consistency. Such properties are not necessary for other uses, such as in the production of butter and margarine where the oil must be soft and spreadable. Margarine, is a common household fat used for a variety of applications. There are several types of margarine, each formulated to fulfill a specific requirement. Good physical properties necessary for quality margarine include emulsion stability without oil separation, no brittleness, good spreadability and a clean, smooth melt in the mouth. Margarine must be firm but spreadable and these properties are related to the proportion of solid and liquid fat in the product at a given temperature. These requirements make it impossible for liquid oils in their native state to be incorporated in these formulations, unless a portion is also hydrogenated, giving rise to TFA. Margarine made significant progress at the expense of butter as the healthy alternate solid fat and a variety of polyunsaturated margarines containing TFA were the norm until a decade ago. With increasing awareness about the detrimental effects of TFA, these TFA containing margarines are being phased out in favour of natural fat based formulations. In such products palm oil has become a favoured ingredient.

DO FAT REFORMULATION EFFORTS SERVE BOTH FUNCTIONALITY AND HEALTH?

Reformulated TFA fats must be proven to be healthier (primarily less cholesterol-raising) than the TFA-rich fats they are designed to replace. Such replacement would preferentially entail the use of natural fats, which are also somewhat rich in saturates. The answer may lie in the American Heart Association’s (AHA) Step-1 diet which advocates equal balancing of saturated and unsaturated fats in your diet. Such a balanced product has been made with palm oil as its major ingredient, patented to improve the cholesterol ratios and proven to be a winner in the United States. Marketed under the brand name “Smart Balance”, this has emerged as one of the main trans free fats in the USA.

LEARN TO STAY TRANS FREE

A good advice is that you the consumer should now begin to read the ingredient list of all processed foods you purchase. Avoid anything that states “partially hydrogenated fats” since they will contain trans. Choose products made with natural oils and fats such as palm oil. Most new food labels include a separate declaration for trans. Always ensure that this is zero. Avoiding trans will help you avoid heart disease and a host of other ailments.