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Health & Nutrition News About Soy

FATTY ACIDS AND CHD: IS REPLACING SATURATES WITH POLYUNSATURATES THE KEY?

By Bruce Griffin, PhD, RNutr

The replacement of dietary saturated fat with polyunsaturated fat has been the mainstay of our dietary guidelines for reducing the risk of coronary heart disease (CHD) for over 30 years.[1] However, the validity of these guidelines has now been challenged by the outcome of meta-analyses that could find no evidence for a direct relationship between the intake of saturated fat and CHD.[2-4] These findings have fueled a backlash of claims that current recommendations to reduce intake of saturated fat are overstated[3] or should never have been introduced.[4]

So what or who should we believe? Have we been over-estimating the importance of saturated fatty acids (SFA) and polyunsaturated fatty acids (PUFA) to cardiovascular health, or have these meta-analyses produced an erroneous outcome that is leading consumers away from dietary guidelines that should be reinforced, rather than ignored? The answers to these questions are of vital importance to nutrition practitioners who have a duty to deliver the correct information to their patients and clients, and the general public, who are the ultimate benefactors of evidence-based dietary guidelines.

Continued on pg. 2

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 Continued from pg. 1

Two of the most recent and controversial studies to raise doubt over the validity of replacing saturated fat with polyunsaturated fat to improve cardiovascular health are the Sydney Heart Study,[5] and a meta-analysis from the Cambridge Epidemiology Unit in the UK.[3] The Sydney Heart Study was a randomly controlled intervention trial with high PUFA safflower oil and margarines in men with existing CHD that was originally conducted between 1966 and 1973, but revisited and reported in 2013.[5] While the re-analysis showed a highly significant increase in risk of CHD in the group who replaced dietary SFA with PUFA, it had two major flaws. First, it failed to control for the intake of trans fatty acids, which are known to raise serum LDL, lower HDL, and have been unequivocally associated with increased CHD risk.[6,7] It is highly likely that these fatty acids were consumed in the test spreads and background diet in the late 1960s. Second, the intake of dietary PUFA in the intervention group increased from 6% at baseline to 15.4% of energy, a level of intake that exceeds previous and current recommendations for these dietary fatty acids in Europe and the U.S. The more recent meta-analysis from Cambridge also concluded that their evidence did not clearly support guidelines to encourage high consumption of dietary PUFA and low consumption of total SFA.[3] Nevertheless, exclusion of the Sydney Heart Study from their analysis produced a beneficial 20% reduction in CHD risk in response to the removal of dietary SFA.[8]

Further insight into the discrepant findings of recent meta-analyses can be gained by placing these secondary forms of analyses in perspective of the totality of existing evidence from primary sources for the impact of saturated fat on CHD. These sources include epidemiological, prospective cohort and randomly controlled trials, all of which are consistent in showing that a high intake of saturated fat *is* related to an increased morbidity and mortality of CHD.[9] What is critical to appreciate is that this relationship is *not* direct, but mediated to a large extent through the capacity of certain SFA to raise serum LDL cholesterol,[7,10] an established risk factor that is directly involved in the development and endpoints of the disease.[11] This provides one major explanation for why meta-analyses can find no direct relationship between SFA and CHD for two reasons. First, the effects of SFA on serum LDL cholesterol are complex and determined by many factors, including macronutrient substitution, variable effects of specific SFAs, and food source, none of which have been fully accounted for in meta-analyses. Second, raised serum LDL cholesterol is a single risk factor influencing a disease (CHD) with multi-factorial origins.

The effects of dietary saturated fat on serum LDL cholesterol are usually described in relative rather than absolute terms. In other words, the effect of removing dietary SFA on serum LDL cholesterol depends, to a large extent, on what macronutrient takes its place. The addition of dietary PUFA, chiefly from linoleic acid from plant sources (soy, safflower, sunflower and corn oils), has been proven to be the most effective substitute for SFA in terms of lowering both LDL cholesterol and CHD risk (1% reduction in energy from SFA equates with ≥2–3% reduction CHD risk).[1, 6-8] In contrast, replacing SFA with monounsaturates or carbohydrates produces a relatively small effect in lowering LDL cholesterol, with little or no benefit to CHD risk. Importantly, if the carbohydrate that replaces SFA is unrefined and high in free sugars, it may exert adverse effects on CHD risk by increasing energy intake and body weight, and/or through the distinct metabolic effects of sugar.[12] Failure of prospective cohort studies to take account of macronutrient substitution over time, may have contributed to the negative outcomes of meta-analyses, as the adverse effects of replacing SFA with unrefined carbohydrates and sugar, counter the beneficial effects of replacing SFA with PUFA.

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Another factor that may help to explain the discrepant findings of meta-analyses is that not all dietary SFA exert the same effect on serum LDL cholesterol. While the potential of dietary SFA to raise serum LDL cholesterol increases with a decreasing number of carbon atoms in the fatty acid chain—from 16 to 12 carbons (palmitic acid and lauric acid, respectively)—an exception is stearic acid (18 carbons), a common constituent of many foods, that has relatively little effect on LDL cholesterol.[13] Similarly, not all SFA increase serum HDL to the same extent. In contrast to LDL, HDL is a cardio-protective lipoprotein, changes in which produce variable effects on the ratio of total to HDL cholesterol, a popular biomarker of CHD risk that is used in clinical practice. However, while a low TC:HDL-cholesterol ratio is indicative of a lower CHD risk, the true functional capacity of HDL to fulfil its physiological roles in protecting the artery walls from the development of CHD, is much more difficult to assess than simply measuring its cholesterol concentration in serum. This means there is no solid evidence, as yet, that lowering this ratio with foods high in SFA that raise HDL, will be beneficial in reducing CHD risk. Dietary fatty acids with medium chain length (6–10 carbons), as contained in medium chain triglycerides (MCTs), exert less of an effect on serum LDL cholesterol, primarily because they are removed rapidly from the blood circulation and oxidized to produce energy, before they can circulate in serum lipoproteins.[13] Interestingly, while the high content of MCTs (~15%) in coconut oil, and its potentially favorable effects on the TC:HDL-C ratio have been used to support health messaging for this oil, there is no convincing evidence to suggest that these effects are operating, or if so, can off-set the adverse effect of coconut oil in raising serum LDL cholesterol.

The impact of dietary SFA on serum LDL cholesterol also depends on the type and composition of food in which the SFA is contained. Nutrients in foods are contained within a food matrix that can influence the absorption and bioavailability of nutrients. Foods also contain complex mixtures of components that can interact to alter the physiological properties of individual nutrients. The best example of this phenomenon in the context of dietary SFA and LDL cholesterol is provided by dairy foods, and specifically the relatively greater LDL cholesterol-raising effect of SFA in butter as compared to cheese.[14] This finding has been attributed to the high calcium content of cheese, which can form insoluble salts with the SFA that cannot be absorbed in the gut and are excreted.[15]

In conclusion, the totality of existing evidence to link dietary SFA with CHD, primarily through its effect on serum LDL cholesterol, is sufficiently robust to uphold current guidelines to reduce SFA intake to no more than 10% of total energy intake, a recommendation that has been recently endorsed in the USA by the Dietary Guideline Advisory Panel.[16] There is a well-documented portfolio of therapeutic diet and lifestyle changes for reducing elevated serum LDL cholesterol,[17] which includes as a priority exchanging dietary SFA with PUFA as the most effective fatty acid substitute. But, how can this be achieved in practice?

The strongest existing evidence for the benefit of diet in reducing CHD risk and mortality comes from randomly controlled intervention trials of whole dietary patterns, the best examples of which are the DASH[18] and Mediterranean diets.[19] The effectiveness of these diets, which are inherently low in SFA and rich in PUFA from plant sources, is helping to shift emphasis away from the study of single nutrients like saturated fat, and towards the development of whole food-based dietary guidelines. It stands to reason, that the most effective dietary approach for reducing the risk and fatal outcome of a disease with multi-factorial origins like CHD, involves more than modifying the intake of dietary fat.

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***Complete references for articles can be found at* www.soyconnection.com**

FATS AND OILS:
MANY CHALLENGES FACED BY INDUSTRY, CONSUMERS

By Eric A. Decker, PhD

The food industry has aggressively decreased the level of saturated fats in processed foods, but such a switch has not been easy since solid fats play an important role in the shelf-life and acceptability of foods.[1] For example, the textural properties of dairy, meat, and some plant foods such as chocolate, are very dependent on their solid fat content. More specifically, solid fats impart creaminess, lubrication and melt-away, the feeling of solid fat converting to liquid oil in the mouth (e.g. margarines and spreads). Solid fats are also important in baked goods because they increase the incorporation of air into products to produce fluffy textures (cookies) and inhibit gluten formation to produce flaky textures. Simple substitution of unsaturated for saturated fats is also a problem because unsaturated fats will become rancid, causing food waste.

The current reduction of saturated fats in the diet reflects a long term trend to change the type of fats in foods. For example, before the wide-spread availability of vegetable oils, most foods were produced with animal fats such as butter, lard and tallow (the original fat in fast food french fries). However, in the late 1950s and early 1960s, nutritionists thought that cholesterol consumption was related to heart disease so the food industry decreased the utilization of animal fats in many foods. Since solid fats play so many important roles in foods, something had to replace the animal fats and in this case it was mainly tropical oils (palm, coconut and palm kernel). Tropical fats are solid because they are also high in saturated fatty acids (e.g. coconut oil is 85 percent saturated fatty acids). However, additional research in the early 1980s suggested that saturated fats were closely associated with heart disease so the food industry switched to partially hydrogenated fats. Partially hydrogenated fats had several advantages because they are solid at room temperature but can be made so that their unsaturated fatty acid levels are high, and partial hydrogenation can be used to remove α-linolenic acid from soybean oil making it much less prone to developing rancidity. Subsequent research then found that trans fatty acids formed by hydrogenation increased LDL cholesterol like saturated fatty acids but also decreased "good" HDL cholesterol, thus making them potentially worse than saturated fatty acids.[2]

The potential health risk posed by trans fatty acids resulted in mandatory inclusion of trans fatty acids on the nutrition fact panel starting in 2006. This prompted food manufacturers to severely reduce the utilization of hydrogenated fats in foods. This action resulted in a large decrease (>60%) in trans fat consumption in a very short time. In 2013, the FDA removed the "generally recognized as safe" recognition from partially hydrogenated fat to further decrease trans fatty acids in the food supply.[3] This change was made because despite the labeling law, some foods continued to use partially hydrogenated oils. Removal of partially hydrogenated fat from food needs to be done by 2016 unless companies get FDA approval. FDA has estimated that further removal of trans fats could prevent an additional 20,000 heart attacks and 7,000 deaths from heart disease each year. Unfortunately, there is no evidence that removal of the very low levels of trans in the diet will actually improve health.

Now that partially hydrogenated fat is no longer allowed in foods, the food industry must again find a fat replacement. Intersterified fats and high oleic oils are the likely candidates to do so.

Editor's Note: **Two Solutions**

An alternative to the replacement of trans fat is high oleic oils. These are oils that are resistant to rancidity in a similar manner to partially hydrogenated fats. High oleic oils are commercially available from seeds such as soy, canola, sunflower and safflower. These oils are produced by isolating breeds of plants that have reduced ability to convert oleic acid to linoleic acid resulting in an accumulation of oleic acid. Biotechnology is also being used in the development of high oleic soybeans. The two major soybean seed companies have introduced versions of high oleic soybeans.

Since oleic acid is ten times less susceptible to oxidation, these oils are much more resistant to rancidity. A major application of high oleic oil is frying because the oil produces good flavor and is shelf stable without the use of hydrogenation.

Interesterified fats is another solution for the replacement of trans fat. Interesterification is the process of taking a high melting fat and a liquid oil and rearranging the fatty acids to produce a fat with a melting range in-between the original fat and oil.

ABOUT THE AUTHOR

Eric Decker, PhD, is a professor and head of the department of Food Science at the University of Massachusetts, Amherst. His research includes mechanisms of lipid oxidation, antioxidant protection of foods, and the health implications of bioactive lipids. Decker has over 350 publications to his credit. He earned his PhD in Food Science from the University of Massachusetts, Amherst.

Healthy Handout

INFORMED CHOICES ESSENTIAL WHEN COOKING WITH FAT

By Jessica Burch, RDN, LDN, CLC

Using fat is essential to most of our cooking techniques, but how do you pick which type is best? Making an informed decision is important when it comes to cooking with fat.

First, let's review some basic chemistry. When fat is heated its chemical composition changes. If overheated, fat will become denatured, forming compounds known as free radicals, which can adversely affect health. When oil is heated and starts to smoke, it indicates that complete denaturization has occurred and the oil should not be consumed. Different types of fat denature at different temperatures, based on chemical composition.

Unsaturated fats come from plants and are broken into two categories—mono and poly. Monounsaturated fats include olive, peanut and canola oils. Polyunsaturated fats include soy (commonly labeled as vegetable oil), corn, and tub margarines. Unsaturated fats are generally a better choice for consumption, as they have been linked with protection against heart disease. However, they may not be the best choice for high heat cooking as they denature more quickly with higher temperatures. Use these for salad dressings, low-slow cooking like braising or in crockpots and baking. Due to refinement, soy (vegetable oil) can withstand higher heat and so may be an appropriate choice for stove top stir frying.

Quick Roasted Potatoes

1 cup cubed Red Bliss or Yukon Gold potatoes
1 cup cubed sweet potato with skin
2 Tablespoons soy oil
1 teaspoon garlic powder
2 teaspoons dried thyme

Preheat oven to 500 degrees.
Leaving the skin on, cut potatoes into 1 inch cubes and place on a baking sheet lined with parchment paper. Place in the oven even if it is not to temperature. The potatoes will begin to cook, shortening the cooking time. Bake for 20–25 minutes or until potatoes are golden and fork tender. Place cooked potatoes in a serving dish. Toss with oil, spices and enjoy! Serves 4.

Nutritional Analysis: Calories per serving, 248; total fat, 7g; sodium, 16g; total carbohydrate, 45g; total protein, 4.4g; fiber, 4g; calcium 42mg; iron 1.4mg.

Saturated fats, with the exception of coconut and palm oil, are found in animal products like clarified butter and lard. Saturated fat is linked to increased risk of cardiovascular disease and minimal use is recommended. However, saturated fats denature more slowly under high heat, which may make them a better choice for high heat cooking methods like sauté and searing.

More research is certainly needed, but at the end of the day, fat is fat. We need some, but too much can be harmful. Consider the type of cooking you are doing when picking your fat and when in doubt skip the fat all together until after the cooking is done. Steaming, poaching and dry roasting are your healthiest options. Add the oil of your choice after the cooking, as suggested in the recipe above.

ABOUT THE AUTHOR

Jessica Burch, RDN, LDN, CLC, is an outpatient dietitian and lactation consultant at Bowdoin Street Health Center, an affiliate of Beth Israel Deaconess Medical Center, in Boston. Here she works one on one with patients as well as in group cooking classes. She studies culinary nutrition at Johnson & Wales University and completed her dietetic Internship at BIDMC.

SOYBEAN OIL CORNER

Soybean Oil Can Be Part of a Healthy Diet

By Lisa Kelly, MPH, RDN

In recent years industry initiatives have drastically reduced the amount of trans fats consumed in the U.S. diet, but the concern now lies with what types of fats and oils should be used as replacements. The United Soybean Board (USB) is taking specific measures to help consumers eliminate trans fats in their diets. USB is working with the food industry to remove trans fats in packaged foods using high oleic soybean oil and innovative new processing methods. Liquid soybean oil is an option for consumers to use as part of a healthy diet.

Commonly labeled as vegetable oil on grocery store shelves, liquid soybean oil is the most widely used edible oil in the U.S.,[1] and its popularity continues to grow as consumers look for trans fat replacements. The oil contains no trans fats, has only 2 grams of saturated fat, and is high in poly- and monounsaturated fats.[2] Soybean oil is one of the few non-fish sources of omega-3s in the U.S. diet.[3] These fatty acids positively affect overall cardiovascular health, including reducing blood pressure and risk of heart disease.[4, 5]

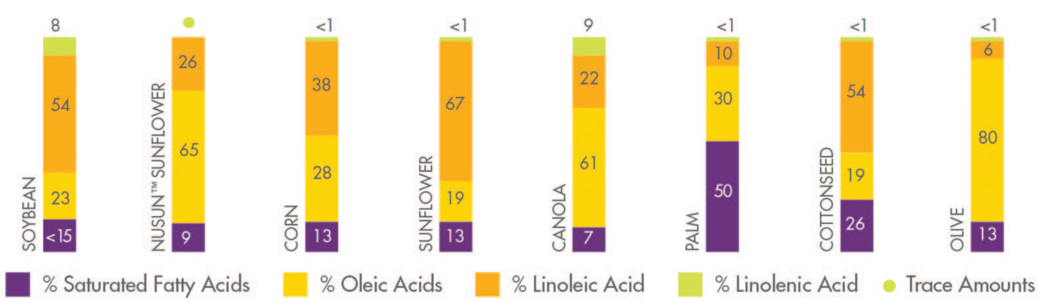
Unlike other popular oils, the majority of soybean oil consumed in the United States is produced domestically,[6] supporting U.S. farmers. More than 550,000 U.S. soybean farmers help put soybean oil on grocery store shelves.[7]

Soybean oil has a neutral flavor and a well-balanced fatty acid profile. It is an affordable and desirable ingredient for many applications, such as pan frying, salad dressings and baked goods.

Soybean oil has a favorable fatty acid profile.

It contributes 0g trans fat to products, is high in poly- and monounsaturated fats, and is relatively low in saturated fat with 2 grams per serving.[2]

Comparison of Fatty Acid Profiles:



2 USDA National Nutrient Database for Standard Reference 2015.

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FATTY ACIDS AND CHD: IS REPLACING SATURATES WITH POLYUNSATURATES THE KEY? *pg. 1*

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SOYBEAN OIL CAN BE PART OF A HEALTHY DIET *pg. 6*

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