



Health effects of dietary fats: Replace risks with benefits

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The metabolism of fatty acids is crucial in patients with diabetes. The quantity and quality of fat in our diets can also affect the development of several health conditions related to diabetes, including obesity, insulin resistance, and cardiovascular disease. All fats are not equal regarding how they affect our health. Some are beneficial, but others are not. Some we get too little of from our diets, but others should be consumed only in limited quantity, if at all. We will review here some general concepts about the different fats in our diets, as well as the widely differing effects they have on our health and risk factors of disease.

The fatty acids discussed here are all contained in triglycerides, a type of fat composed of three fatty acids and glycerol. Fat of any type is relatively calorie-dense, with 9 kilocalories[diet calories]/gram. In contrast, carbohydrate and protein have ~4 kilocalories/gram as the other major energy sources. So, regardless of the risks or benefits of a given type of fat, portion control is always important when considering dietary fat. A person can overdo anything—even olive oil.

Depending on their biochemical properties, fatty acids fall into four major groups: *trans*, saturated, monounsaturated, and polyunsaturated or omega. The last three groups exist naturally and are found in relatively large amounts in some foods. The first group, *trans*, exists naturally, but only in small amounts in fat derived from ruminants. The bulk of *trans* fat in our diet comes from partially hydrogenated vegetable oils (1). Vegetable oils that contain large amounts of polyunsaturated fat are partially hydrogenated to raise their melting point, and help reduce rancidity, which increases their shelf-life. All four types of fat may be present in cooking oils and foods, but their amounts and proportions vary greatly.

***Trans* fat.** The bad news is that *trans* fat promotes inflammation, aggravates insulin resistance, and increases the risk of developing diabetes or even sudden cardiac death (1). Furthermore, it increases LDL-cholesterol and decreases HDL-cholesterol concentrations in the blood, while also increasing concentrations of VLDL-cholesterol and triglycerides. These effects can contribute to a proatherogenic lipoprotein profile. Food sources of *trans* fats include margarines, shortening, baked goods, and deep-fried foods such as French fries or chicken. The good news is that intake of *trans* fat can often be avoided by using a two-step strategy when buying food. First, read the labels. Food labels must list *trans* fat content, so look for zero in the *trans* fat section. The second step is necessary because labels do not have to list *trans* fat content if it is less than 0.5 gram per serving. So, second, check the list of ingredients. No matter what the label says, if the product contains partially hydrogenated oils, it probably contains some *trans* fat. Overall, *trans* fats are recommended to be kept below 1% of total energy intake (1, 2). Zero would be optimal.

Saturated fat. Saturated fats tend to raise both LDL-cholesterol and HDL-cholesterol (3). In excess, they also tend to promote insulin resistance. Therefore, saturated fat should be consumed only in limited quantities. The American Heart Association recommends consuming no more than 7% of total calories as saturated fat with a total dietary fat intake of 25-35% total calories (2). Saturated fat occurs naturally in all dietary sources of fat derived from both plant and animal, but it is highest in fats from animals, especially dairy fats. In the human diet, the most common fatty acids of this type are palmitic acid and stearic acid. We cannot avoid saturated fats, but we can reduce the proportion of them in our diets by checking food labels and, of course, limiting our intake.

Monounsaturated fatty acids (MUFAs). Increasing the dietary proportion of these fatty acids increases HDL-cholesterol and reduces LDL-cholesterol (3), thus improving blood cholesterol profiles. Increasing the proportion of MUFAs also reduces overall factors for cardiovascular risk, as has been demonstrated by dietary approaches that use olive oil as a staple along with other healthy constituents, such as the Mediterranean diet approach (4). Olive oil contains a high proportion of oleic acid (71%), which is the most common MUFA in our diets. Olive oil also has anti-inflammatory properties, although it is not clear whether these properties come from oleic acid alone or are a synergistic effect coming from other components of olive oil. Another tasty source of MUFAs is macadamia nut oil (84%) (5).

Polyunsaturated fatty acids (PUFAs), or omega fatty acids. PUFAs are designated as omega fatty acids, and you may already know some of their benefits. I devoted an entire article (6) to two of the omega-3 fatty acids that come from fish, eicosapentaenoic (EPA) and docosahexaenoic (DHA), so here I compare the omega-3 and omega-6 fatty acids. The omega-3 fatty acids in fish oil reduce the risk of sudden cardiac death, lower blood triglycerides, slightly raise HDL-cholesterol concentrations, and reduce the proinflammatory and prothrombotic states often found in obese and insulin-resistant individuals. Another omega-3 fatty acid, alpha-linolenic acid, comes almost exclusively from plant sources such as flax seed oil and broccoli. One benefit of alpha-linolenic acid is a reduction in the risk of sudden cardiac death (7), albeit without the wider-ranging health-promoting effects of EPA and DHA (6).

In contrast to omega-3 fatty acids, omega-6 fatty acids are extremely common in the western diet, coming mainly from vegetable oils and in the form of linoleic acid. Both linoleic (omega-6) and alpha-linolenic (omega-3) fatty acids are essential in the human diet. However, excess omega-6 fatty acids, beyond the essential requirements for linoleic acid, may promote proinflammatory and prothrombotic states, which are often a problem in insulin-resistant individuals. In the current western diet, the ratio of omega-6 to omega-3 fatty acids is about 20 or 25 to 1, which may be too high. The recommendation here is to lower the overall ratio by replacing omega-6 fatty acids with omega-3 fatty acids when possible. Oils particularly high in omega-6 fatty acids include safflower oil (78%), sunflower oil (69%), and corn oil (57%) (5). Good sources of omega-3 fatty acids include flaxseed oil, non-hydrogenated soybean oil, and canola oil, as well as certain nuts, including walnuts and macadamia nuts.

Summary. Different types of fats in our diet affect our health differently. Some effects are beneficial, but others can lead to serious health risks. Fat, regardless of the type, is high in calories and should be a substitute for another source of energy, such as simple carbohydrates, in one's diet. We can each take direct action to improve the quality—and help control the quantity—of our fat intake simply by reading the labels on our foods. By enriching our diets with fruits, vegetables, nuts, fish, lean meats, whole grains, and low-fat dairy, we provide our bodies with the healthy fats they require. If we can also avoid the sources and types of fats known to cause health risks, we can further improve our long-term health benefits.

References.

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