Seed Oils: Fact vs. Fiction

Seed oils are a subset of vegetable oils that are derived from the seeds, rather than the fruit, of plants. Examples include soybean, canola, corn, sunflower, cottonseed, peanut, rice, safflower, sesame and grapeseed.

Dietary Fat, Seed Oils and Health

Fat is one of the three macronutrients along with protein and carbohydrate. Approximately one-third of the caloric intake of Americans comes from fat,[1] which is lower than some countries such as Greece and France, but higher than countries such as Japan and Mexico.[2]

Dietary fat is an essential nutrient, serving vital health functions. For example, fat is critical for growth and development. It plays a crucial role in the body absorbing important fat-soluble vitamins (A, D, E, and K) and it supports key body processes, including immune response, blood clotting, nervous system function and reproduction.[3]

All edible oils are composed of various fatty acids, which are building blocks of fat. These fatty acids consist of two general types: saturated and unsaturated. The former are typically associated with animal fat and the latter with plant fat. However, all fats are a mixture of unsaturated and saturated fatty acids. For example, butter is composed of 69% saturated and 31% unsaturated fat[4] and canola oil contains 7% saturated and 93% unsaturated fat.

While the compositions of seed oils vary, they all contain largely unsaturated fatty acids.[5] These are subdivided into two categories: monounsaturated and polyunsaturated. In the diet, the predominant monounsaturated fatty acid (MUFA) is oleic acid and the main polyunsaturated fatty acid (PUFA) is linoleic acid.

PUFAs are subdivided into omega-6 (linoleic acid) and omega-3 (alpha-linolenic) fatty acids. The human body requires these two fatty acids for survival but cannot make them on its own so they are considered essential and must come from dietary intake.

Unsaturated fatty acids in seed oils, including MUFA, are supportive of reduced risk of chronic diseases such as cardiovascular disease, type 2 diabetes and obesity.[6, 7] In fact, qualified health claims for canola[8], soybean[9] and corn[10] oils on their ability to reduce the risk of heart disease were authorized by the U.S. Food and Drug Administration, which reviewed comprehensive dossiers of scientific evidence.

Prospective cohort studies involving large numbers of participants consistently show that linoleic intake and biological markers of linoleic acid intake are associated with lower risks of coronary artery disease[11, 12, 13, 14] **and type 2 diabetes.**[15, 16] Other examples include human intervention studies showing that linoleic acid intake favorably affects markers of cardiometabolic health.[17, 18] In fact, systematic reviews and meta-analyses of randomized controlled trials on the intake of canola oil,[19, 20] rice bran oil,[21] soybean oil, [22, 23, 24, 25, 26, 27, 28] corn oil,[29, 30, 31] cottonseed oil,[32, 33] and sunflower oil[34, 35] consistently show improvements in lipids

(fatty acids or their derivatives) and lipoproteins (soluble proteins that combine with and transport fat or other lipids in the blood).

Debunking Inaccuracies About Seed Oils

Fact: Medical science and research indicates that seed oils do NOT cause inflammation.
There is an inaccurate claim that linoleic acid, which is contained in seed oils, increases inflammation. This is based on a flawed understanding of linoleic acid metabolism[36, 37, 38, 39] and its consequences.[40, 41] Multiple human intervention studies have shown that changing the linoleic acid content of the diet does not impact biological markers of inflammation.[42, 43, 44] In fact, several population studies have found higher linoleic intake actually reduces the biologic markers of inflammation.[45, 46]

Fact: Linoleic acid intake levels in the United States are consistent with health recommendations.
Current U.S. linoleic acid intake accounts for about 8% of total calories.[47] This is under the World Health Organization's recommended limit of 9% of caloric intake[48] and within the range recommended by American Heart Association (5-10%).[49]

Fact: Health agencies around the world and notable experts have concluded that the omega-6 to omega-3 ratio does NOT reflect diet quality.
Old conventional thinking once believed that having a relatively low omega-6 to omega-3 ratio (<5:1) promoted health. However, over the past 20 years, health agencies around the world[50] as well as noted experts[51] have concluded this ratio does not reflect diet quality. The current emphasis is on making sure *enough* omega-6 and omega-3 fatty acids are consumed, not focusing on the ratio of the two types.

Fact: Clinical studies show that linoleic acid intake does NOT increase oxidative stress.
Oxidative stress has been implicated in the development of many chronic diseases, including cardiovascular disease, cancer, type 2 diabetes and neurological disease.[52] Humans have internal mechanisms in place to neutralize oxidants.[53] Clinical studies show that linoleic acid intake does NOT increase markers of oxidative stress.[54, 55, 56]

Fact: Scientific studies consistently show that higher linoleic acid intake is associated with POSITIVE, not adverse, health effects.
Prospective cohort studies involving large numbers of participants consistently show that linoleic acid intake and biological markers of its intake are associated with lower risks of coronary artery disease[57, 58, 59, 60] and type 2 diabetes.[61, 62] Human intervention studies show that linoleic acid intake favorably affects markers of cardiometabolic health.[63, 64]

Fact: The current body of science consistently shows a POSITIVE relationship between the intake of seed oil and improvements in lipids and lipoproteins.
Systematic reviews and meta-analyses of randomized controlled trials on the intake of canola oil,[65, 66] rice bran oil,[67] soybean oil,[68, 69, 70, 71, 72, 73, 74] corn oil,[75, 76, 77] cottonseed oil,[78, 79] and sunflower oil[80, 81] consistently show improvements in lipids and lipoproteins.

Important Clarifications

Like all foods, seed oils can spoil, which means oxidation.
Seeds oils contain varying amounts of linoleic acid and, in some cases like canola oil, also alpha-linolenic acid. These two fatty acids are susceptible to oxidation, better known as rancidity.[82] For this reason, seed oils should be stored in cool, dark locations with their lids tightly closed.

Chronic disease in the United States increased during the same time frame that seed oil and linoleic acid consumption increased, but this does not mean one caused the other. In fact, many studies demonstrate the opposite.
U.S. rates of type 2 diabetes[83] and obesity[84] (a leading risk factor for type 2 diabetes) have markedly increased over the past several decades. Conversely, deaths due to cardiovascular disease have *declined dramatically* since the 1950s.[85] Seed oils began gaining popularity in the 1960s,[86] with the consumption of linoleic acid also increasing as seed oil consumption increased.[87]

Researchers and scientists alike know that things occurring at the same time does not mean that one causes the other; correlation is not causation. These types of observations are not a sound scientific basis for drawing meaningful conclusions, but they can be a possible basis for further exploration.

When examining the specific relationship between seed oil/linoleic acid consumption and chronic disease – as opposed to merely observing that they both increased at the same time – prospective cohort studies involving large numbers of participants consistently show that linoleic intake and biological markers of its intake are associated with lower risks of coronary artery disease[88, 89, 90, 91] and type 2 diabetes.[92, 93] Human intervention studies show that linoleic acid intake favorably affects markers of cardiometabolic health.[94, 95]

Seed oils are extracted from seeds and their processing removes undesirable compounds.
Refined seed oils undergo several processing steps during and after their extraction from seeds. But their fatty acid profile does not change, only oil quality. Oilseeds are first crushed mechanically, removing about 80 percent of their oil. Then the seeds are further processed with a solvent to remove as much of the remaining oil as possible. The solvent is removed through evaporation under strict safety standards. Further processing of crude seed oil ensures consumer safety and affordability balanced with nutrient retention.

Steps to make seed oils stable for cooking at high temperatures are collectively known as refinement, which includes “bleaching” and deodorization. Bleaching, which has nothing to do with commercial bleach, is a process used worldwide in the edible oil industry to enable oils to withstand high heat by removing compounds that increase the rate of oxidation. The process passes oil through a naturally occurring, soil-like substance known as “bleaching earth” to remove contaminants and unwanted impurities, particularly color bodies. This color removal is the reason the step is called “bleaching.” The last step is deodorization, which involves a steam-

distillation process in which odoriferous and other undesirable compounds are stripped off with steam. All refined oils must meet strict quality and safety standards prior to commercial sale.

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