

Omega-9 Fatty Acids



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If you want to learn about omega-3 and omega-6 fatty acids, there is a plethora of information available on the web and through other resources. Omega-9 fatty acids, however, are far less commonly discussed, despite the fact that research has demonstrated their benefit in promoting cardiovascular health, reducing the risk of diabetes and certain cancers, and improving other areas of human health in some situations. This article, therefore, will serve as a basic primer for omega-9 fatty acids. In the interest of presenting relevant information, I'm limiting my discussion to research conducted on humans.

Omega-9 Fatty Acids Defined

Omega-9 is a family of monounsaturated fatty acids that are commonly found in vegetables and animal fats. These fatty acids are described as omega-9 because the double bond is in the ninth position from the methyl end of the fatty acid (don't worry, that's the extent of chemistry for this article). Specific omega-9 fatty acids

include oleic acid (found in olive oil, macadamia oil and almonds), erucic acid (found in rapeseed, aka canola, wallflower seed and mustard seed) and eicosanoic acid, also called arachidic acid (found in peanut oil).¹

Cardiovascular Health

Many experts have recommended that Western industrialized nations should significantly reduce overall omega-6 fatty acid intake and increase omega-9 and omega-3 fatty acids intake in order to improve cardiovascular health.² Furthermore, dietary modifications, including increased intake of omega-9 and omega-3 fatty acids and soluble fiber, are suggested to help reduce cholesterol levels and prevent coronary artery disease.^{3,4} In fact, *The Dietary Guidelines for Americans, 2010, 7th edition*,³ has placed an increased emphasis on consuming higher levels of healthy oils ("good fats") and reducing consumption of trans and saturated fats ("bad fats"). The report indicates that dietary monounsaturated fatty acids (MUFA), such as omega-9s, are

associated with improved blood lipids related to both cardiovascular disease and type-2 diabetes when used as a replacement for dietary saturated fat. The evidence shows that a five percent calorie replacement of saturated fat with MUFA decreases markers and the risk of cardiovascular disease. Additional research has also shown that omega-9 consumption benefits cardiovascular health.

Palmitic acid, found in animal and plant foods, is the most common saturated fatty acids. To investigate the effects of palmitic acid versus the omega-9 fatty acid oleic acid on cardiovascular disease risk, a three-week crossover trial⁶ was conducted. The results were that replacing dietary palmitic acid with oleic acid reduces the blood LDL concentration and whole-body fat oxidation. In women, these effects were also associated with a higher production and accumulation of acylcarnitines, possibly reflecting a shift in fat catabolism (i.e. the breakdown of stored body fat). Likewise, in the Nurses' Health Study of 85,000

nurses,⁷ consumption of monounsaturated fats, such as oleic acid from olive oil (and polyunsaturated oils, such as alpha-linolenic acid from nuts) reduced risk of coronary heart disease.

In addition, omega-9s may offer benefit for blood pressure. The International Study of Macro/Micronutrients and Blood Pressure is a cross-sectional epidemiologic study⁸ of 4,680 men and women ages 40-59 years from 17 population samples in China, Japan, UK and USA. Nutrient intake data were based on dietary recall and urinalysis. Blood pressure was measured eight times at four visits. Results showed a significant relationship between MUFA intake and reduction of diastolic blood pressure ($P < 0.05$). This relationship with oleic acid from vegetable sources were strong and significant ($P < 0.05$). The researchers concluded that that dietary MUFA intake, especially oleic acid from vegetable sources, may contribute to prevention and control of adverse blood pressure levels in general populations.

Diabetes

The Dietary Guidelines for Americans, 2010, 7th edition,⁹ also indicates that dietary MUFA are associated with improved blood lipids related to type 2 diabetes and improves insulin responsiveness in insulin resistant and type 2 diabetes individuals when used as a replacement for dietary saturated fat. Furthermore, the report states: "Moderate evidence indicates that increased monounsaturated fat intake, rather than high carbohydrate intake, may be beneficial for persons with type 2 diabetes. High monounsaturated fat intake, when replacing a high carbohydrate intake results in improved biomarkers of glucose tolerance and diabetic control."¹⁰

It is interesting that, compared to palmitic acid, diets rich in oleic acid are also associated with reduced risk of type 2 diabetes. This was seen in a randomized, crossover trial¹¹ comparing a high-palmitic acid diet to a high-oleic acid diet. Specifically, insulin sensitivity was much higher with a high-oleic acid diet.

Cancer

Abundant data have attributed a breast cancer inhibiting effect for olive oil (rich in the omega-9 MUFA

oleic acid), which is associated with low incidence and mortality rates from chronic diseases including breast cancer.¹² Case control studies in Greece, Spain and Italy have reported that higher consumption of olive oil is associated with a lower risk for breast cancer.¹³ One study found that that a higher content of oleic acid in adipose was associated with lower risk of breast cancer in Spanish women.¹⁴ Likewise, the lower rates of prostate cancer in Mediterranean countries have been attributed to a high consumption of olive oil.¹⁵

This protective effect is probably due to a combination of oleic acid and the antioxidants present in olive oil.^{16,17,18} The role of oleic acid is likely related to its effect on HER2, a gene shown to play an important role in the development and progression of certain aggressive types of breast cancer. Recent reports have demonstrated that olive oil may influence crucial transcription factors and reduce breast tumor aggressiveness by targeting HER2—and oleic acid found in olive oil is known to repress the transcriptional activity of the HER2 gene.¹⁹

Other Areas of Human Health

Since unusual fatty acid metabolism has been reported in attention deficit hyperactivity disorder (ADHD), its relationship with temperament was examined in study²⁰ with twenty adolescent boys with ADHD. The study investigated the association between blood levels of fatty acids implicated in brain structure and function (omega-3, omega-6, omega-9) and personality traits including "plasticity" (extraversion and openness). The results demonstrated that oleic acid was positively associated with plasticity, suggesting its involvement in myelination of neurons and a strong association with temperament in adolescents with ADHD.

Two randomized, double-blind, crossover trials²¹ were conducted to examine how a high-palmitic acid diet compared to a high-oleic acid diet would affect physical activity and energy expenditure in young adults. The results were that physical activity was higher during the high-oleic acid diet than during the high-palmitic acid diet in the first study ($P = 0.003$) and in the second study ($P = 0.003$). In addition, resting energy expenditure

was 3 percent higher with the high-oleic acid diet compared to the high-palmitic acid diet in the first study ($P < 0.01$), 4.5 percent higher in the second study ($P = 0.04$). It was also interesting that Profile of Mood States testing showed that the anger-hostility score was significantly higher during the high-palmitic acid diet compared to the high-oleic acid diet ($P = 0.007$). In short, replacing palmitic acid with oleic acid was associated with increased physical activity and resting energy expenditure, and less anger.

Adiponectin is a protein hormone involved in regulating glucose levels as well as fatty acid breakdown. It is also generally considered to have anti-inflammatory properties. Since dietary fat may affect adiponectin levels, a study²² was conducted to evaluate this relationship in 116 healthy individuals. The results showed that the percentage of saturated fatty acids were significantly associated with lower adiponectin concentrations ($P = 0.002$). Conversely, the omega-9 fatty acid eicosanoic acid was significantly and positively associated with higher adiponectin levels in all individuals ($P = 0.01$), especially smokers ($P = 0.007$).

Conclusion

Hopefully, this article has provided you with a better understanding of the value of omega-9 fatty acids, and the multiple benefits they offer for human health—particularly when substituted for saturated fats. **VR**

For a full list of references, visit www.vitaminretailer.com.

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