

MUFAs¹

By chemical definition, MUFAs are FAs that have only 1 unsaturated carbon bond. Oleic acid (OA; 18:1n-9)² and palmitoleic acid (PO; 16:1n-7) are the most common MUFAs although many less abundant MUFAs species exist. In addition to obtaining MUFAs from the diet, MUFA can also be synthesized by elongase and desaturase enzymes from SFAs primarily derived from de novo lipogenesis. From a nutrition standpoint, MUFAs have mixed effects on human health. However, recent evidence tends to indicate more beneficial effects, in particular, on reducing risk of cardiovascular diseases and other inflammation-related diseases, although these effects differ between the individual MUFAs. Accordingly, MUFA-enriched foods such as olive oil are among highly recommended healthy foods.

Deficiencies

In addition to their endogenous biosynthesis, MUFAs are enriched in a wide variety of foods, and oils containing MUFAs are routinely used in cooking. As such, MUFA deficiencies have not been observed.

Diet Recommendations

There is no DRI/adequate intake (AI) for total fats, and the Institute of Medicine only recommends an acceptable macronutrient distribution range, which is 20–35% of calories (1). The health-promoting effects of PUFAs have led to the development of an AI for linoleic acid (18:2n-6) and linolenic acid (18:3n-3), but no DRI/AI exists for MUFAs. Despite that lack of defined recommendations, the “Mediterranean Diet” is an MUFA-enriched diet that is highly prescribed by nutritionists and physicians for its health-promoting effects.

Food Sources

Foods that are high in MUFAs include plant-based oils such as olive oil, canola oil, peanut oil, safflower oil, and sesame oil. In addition, nuts such as cashews, almonds, pistachios, macadamia, and hazelnuts are high in MUFAs. Avocados, animal fats, and a variety of seeds also have high MUFA content.

Clinical Uses

MUFA-enriched foods have been highly recommended for reducing risk of cardiovascular diseases, managing body weight, and producing other health benefits.

Toxicity

It is very rare that MUFAs are associated with toxic effects. In contrast, MUFAs may protect against drug-induced hepatotoxicity.

Recent Research

Given its abundance in olive oil and, therefore, the Mediterranean Diet, OA consumption has been linked to numerous health benefits. Recent results from the Prevención con Dieta

Mediterránea (PREDIMED) study reveal that the Mediterranean Diet supplemented with olive oil reduces central obesity and incidence of type 2 diabetes and cardiovascular disease (2, 3). Like many studies it is difficult to ascertain the effects of olive oil or, more specifically, OA, from other components of the diet including the polyphenols that are enriched in olive oil. Although many studies support beneficial effects of dietary OA, research is needed to clarify the specific effects of OA on health outcomes. In contrast to dietary OA, de novo synthesized OA appears to have dissimilar effects perhaps because of differential trafficking and signaling of the OA in cells. PO has drawn increasing attention since its characterization as a bioactive lipid that coordinates metabolic crosstalk between the liver and adipose tissue (4). Studies in cultured hepatocytes and mouse models of diet-induced obesity suggest that PO has anti-inflammatory and insulin-sensitizing effects (5). These anti-inflammatory effects appear to contribute to the insulin-sensitizing effect of PO. In contrast, serum PO does not correlate to insulin sensitivity or incident diabetes in humans (6, 7). In addition, PO appears to be lipogenic (5). Recent data from human studies strongly support that serum concentrations of PO reflect hepatic lipogenesis (8). Overall, limited studies in humans are mixed and there is no clear effect of PO on health outcomes. Clearly, further controlled intervention studies are needed to specifically test the effects of various MUFAs. Given the general benefits of MUFA-enriched diets and the lower intake of MUFAs by Americans relative to the Mediterranean diet, it is recommended to increase intake of MUFAs for health benefits.

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²Abbreviations used: AI, adequate intake; OA, oleic acid; PO, palmitoleic acid.

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