



The Mediterranean diet: an “evergreen” diet

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The rising incidence of obesity worldwide is associated with several serious medical complications, including cardiovascular disease, type 2 diabetes (T2D), hyperlipidemia, hypertension, and nonalcoholic fatty liver disease (NAFLD) (1,2). This constellation is also recognized as the metabolic syndrome and is characterized by underlying insulin resistance (IR). In reality, the exact mechanism by which obesity promotes metabolic syndrome is not fully understood.

The Mediterranean diet is a modern nutritional recommendation originally inspired by the dietary patterns of Southern Italy, Spain, and Greece in the 1950s (3). The principal aspects of this diet include proportionally high consumption of olive oil, legumes, unrefined cereals, fruits, and vegetables, moderate to high consumption of fish, moderate consumption of dairy products (mostly as cheese and yogurt), moderate wine consumption, and low consumption of non-fish meat products (4) (*Figure 1*). The Mediterranean diet would have varied benefits on the health and therefore also on body weight and metabolic syndrome.

The PREvención con DIeta MEDiterránea (PREDIMED) trial (5) has also provided first-level evidence of cardiovascular protection by the Mediterranean diet. Estruch *et al.* (6) showed that a long-term intervention with an unrestricted-calorie, high-vegetable-fat Mediterranean diet was associated with decreases in bodyweight and less gain in central adiposity compared with a control diet. Overall, Estruch *et al.* (6) showed that an increase in vegetable fat intake from natural sources in the setting of a Mediterranean diet had little effect on bodyweight or central adiposity in older individuals who were mostly overweight or obese at baseline. Instead, small but

significant reductions in weight and lesser increases in waist circumference were seen in participants given the Mediterranean diet interventions compared with the control group, as reported by Estruch *et al.* (6). Torjesen showed that high fat Mediterranean diet is not linked to greater weight gain than low fat diet (7).

However, there is tentative evidence that the Mediterranean diet lowers the risk of heart disease and early death (8,9). In a Mediterranean trial focused on dietary fat interventions, baseline intake of saturated and animal fat was not associated with T2D incidence, but the yearly updated intake of saturated and animal fat was associated with a higher risk of T2D (10). Cheese and butter intake was associated with a higher risk of T2D, whereas whole-fat yogurt intake was associated with a lower risk of T2D (10).

Olive oil may be the main source of fat and health-promoting component of the Mediterranean diet (11). There is preliminary evidence that regular consumption of olive oil may lower all-cause mortality and the risk of cancer, cardiovascular disease, neurodegeneration, and several chronic diseases (12).

Furthermore, a dietary intervention consisting of a Mediterranean diet could delay or slow down the natural progression of NAFLD, thus, being beneficial for its prevention and treatment, as showed by Cueto-Galán *et al.* (13).

The human gastrointestinal microbiota functions as an important mediator of diet for host metabolism. Thus, the intestinal microbiota might be selected on the basis of the diets that we consume, which can open opportunities to affect gut health through modulation of gut microbiota with dietary supplementations (14).

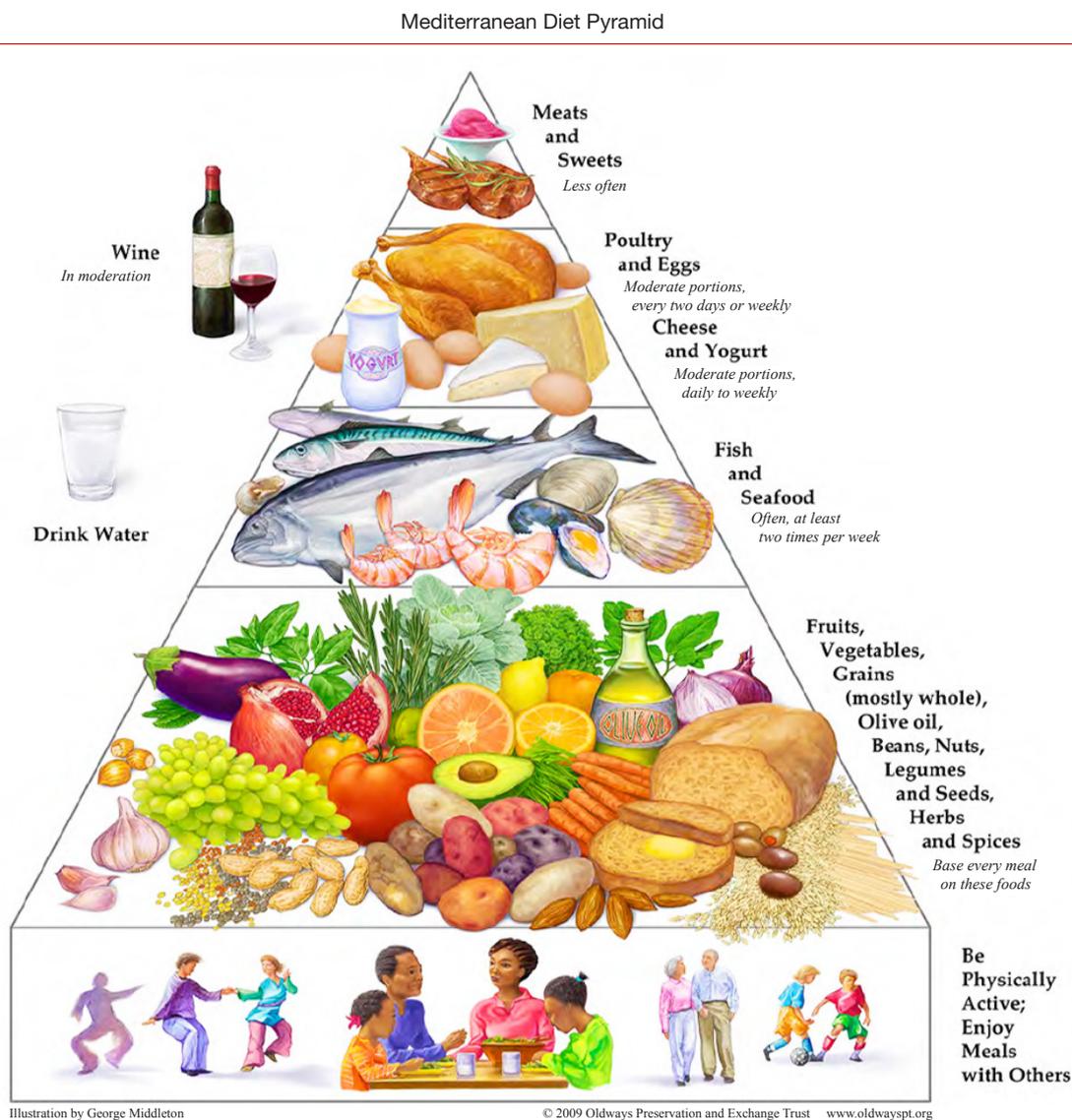


Figure 1 The Mediterranean diet pyramid.

Recently, Hernandez *et al.* (15) showed that the traditional Mediterranean diet, especially when enriched with virgin olive oil, improved HDL atheroprotective functions in humans.

A simplified way of eating healthily by excluding highly-processed foods, is presumed to be the Paleolithic diet (a diet based on vegetables, fruits, nuts, roots, meat, organ meats) which improves IR, ameliorates dyslipidemia, reduces hypertension and may reduce the risk of age-related diseases (16). Whalen *et al.* (17) suggest that diets closer to Paleolithic or Mediterranean diet patterns may be inversely

associated with all-cause and cause-specific mortality.

Following a Mediterranean diet has many benefits, but there are still a lot of misconceptions on exactly how to take advantage of the lifestyle to lead a healthier, longer life. There is an apparent importance of healthier lifestyle habits including physical activity and adherence to the Mediterranean diet *also* among children and adolescents, as reported by Martino *et al.* (18).

Our knowledge of the pathological consequences of lack of adequate exercise on adipose tissue, skeletal muscle and the liver is improving, and this will help establish

more specific guidelines for the proper exercise regimens that will improve underlying metabolic pathways (19). Environmental factors that discourage physical activity include an environment that encourages automobile use rather than walking (like lack of sidewalks), and that has few cues to promote activity and numerous cues that discourage activity (television, computers, etc.) (19).

Either way, in 2013, UNESCO added the Mediterranean diet to the Representative List of the Intangible Cultural Heritage of Humanity of Italy (promoter), Morocco, Spain, Portugal, Greece, Cyprus, and Croatia (20). It was chosen because “The Mediterranean diet involves a set of skills, knowledge, rituals, symbols and traditions concerning crops, harvesting, fishing, animal husbandry, conservation, processing, cooking, and particularly the sharing and consumption of food.” (20).

Our feeling is that the Mediterranean diet remains an “evergreen”, is the appropriate word, diet.

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