

## Pistachios offer multiple benefits

EurekAlert

Pistachio nuts, eaten as part of a healthy diet, can increase the levels of antioxidants in the blood of adults with high cholesterol, according to an international team of nutritional scientists.

"Our previous study showed the benefits of pistachios in lowering lipids and lipoproteins, which are a risk factor for heart disease," said Penny Kris-Etherton, distinguished professor of nutrition, Penn State. "This new study shows an additional effect of pistachios so now there are multiple health benefits of eating pistachios."

The researchers note in today's (May 20) issue of the *Journal of Nutrition* that "pistachios are high in lutein, beta-carotene and gamma-tocopherol relative to other nuts; however, studies of the effects of pistachios on oxidative status are lacking." Beta-carotene is the precursor to vitamin A and gamma-tocopherol is a common form of vitamin E. Lutein is found in dark green leafy vegetables and is important in vision and healthy skin. All three compounds are oil soluble vitamins.

Antioxidants are of interest because oxidized low-density lipoproteins (LDL) are implicated in inflammation and plaque buildup inside blood vessels. Antioxidants should prevent LDLs from oxidizing, migrating into the blood vessel walls and causing inflammation.

"Currently, studies on antioxidants do not show major benefits," said Kris-Etherton. "Maybe we are not studying people long enough. Maybe there is something in the food that travels with the antioxidants. The antioxidant story is very disappointing to the scientific community."

The reason for the disappointment is that studies on specific antioxidants currently do not show health benefits, but epidemiological studies seem to indicate benefits. Many people feel that we have not figured out antioxidants yet, said Kris-Etherton. If antioxidants are important, then pistachios fit the bill as antioxidant-laden food. The researchers conducted a randomized, crossover design, controlled feeding experiment to test the effects of pistachios on antioxidant levels when added to a heart healthy moderate-fat diet. Controlled feeding experiments provide all the food eaten by study subjects for the duration of the study period.

The participants began the study by eating a typical American diet consisting of 35 percent total fat and 11 percent saturated fat for two weeks. They then tested three diets for four weeks each with about a two-week break between each diet. All three diets were variations on the Step I Diet, a cholesterol-lowering diet in general use. The diets included, as a control, a Step I Diet with no pistachios and about 25 percent total fat and 8 percent saturated fat. The pistachio-enhanced diets were Step I Diets with 10 and 20 percent of the energy supplied by pistachio nuts, respectively. The 10 percent pistachio diet had 30 percent total fat and 8 percent saturated fat and the 20 percent pistachio diet had 34 percent total fat and 8 percent saturated fat.

The actual amounts of pistachios included in each diet were 1.5 ounces and 3 ounces for the 10 and 20 percent diets, respectively.

Both pistachio diets produced higher blood serum levels of beta-carotene, lutein

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Published on Medical Design Technology (<http://www.mdtmag.com>)

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and gamma-tocopherol than the typical American diet. Compared to the pistachio free Step I Diet, the pistachio-enhanced diets produced greater blood plasma levels of lutein and gamma-tocopherol. After eating both pistachio-enriched diets, the participants had lower oxidized-LDL concentrations in their blood than after the control Step I Diet.

When the researchers controlled for the change in LDL-cholesterol produced by the pistachio-enhanced diets, increases in beta-carotene and gamma-tocopherol were still associated with decreased oxidized-LDL for the 3-ounce pistachio-enhanced diet.

"Our results suggest that a heart-healthy diet including pistachios contributes to a decrease in serum oxidized-LDL levels, in part through cholesterol lowering, and also due to an added benefit of the antioxidants in the pistachios," said Kris-Etherton.

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