Today’s Topics

- Why is extra virgin olive oil so special?
- What are the proven benefits of including EVOO in a healthful diet?
- What are the areas of emerging science?
- What are claims that can be made?
- What are claims to avoid?
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Why is EVOO so special?

• **FAT**
  – 85% unsaturated fat

• **PHENOLICS**
  – includes antioxidants and anti-inflammatory substances

• **FLAVOR**
  – incredibly appealing ingredient due to the flavor contributions to other healthful foods
# Types of Fat in the American Diet

<table>
<thead>
<tr>
<th>Type of Fat</th>
<th>Found in Foods Like…</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Trans Fat</td>
<td></td>
</tr>
<tr>
<td>• Artificial Trans Fat</td>
<td>Processed crackers, cookies, donuts</td>
</tr>
<tr>
<td>• Natural Trans Fat</td>
<td>Beef, butter</td>
</tr>
<tr>
<td>(2) Saturated Fat</td>
<td>All foods that contain fat contain a</td>
</tr>
<tr>
<td>(3) Monounsaturated Fat</td>
<td>combination of saturated,</td>
</tr>
<tr>
<td>(4) Polyunsaturated Fat</td>
<td>monounsaturated &amp; polyunsaturated fat.</td>
</tr>
<tr>
<td>• Omega-6</td>
<td>Vegetable oils</td>
</tr>
<tr>
<td>• Plant omega-3 (ALA)</td>
<td>Flaxseed, walnuts, soybean oil</td>
</tr>
<tr>
<td>• Marine omega-3 (DHA, EPA)</td>
<td>Salmon, tuna, herring</td>
</tr>
</tbody>
</table>
### Nutrition Facts

**Serving Size**
This tells you what amount equals one serving of the product. Every other nutrient value listed on the label is based on this amount.

<table>
<thead>
<tr>
<th>Amount per serving</th>
<th>Calories from Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Fat</strong></td>
<td>1g</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>0g</td>
</tr>
<tr>
<td>Trans Fat</td>
<td>0g</td>
</tr>
<tr>
<td><strong>Cholesterol</strong></td>
<td>0mg</td>
</tr>
<tr>
<td><strong>Sodium</strong></td>
<td>30mg</td>
</tr>
<tr>
<td><strong>Total Carbohydrate</strong></td>
<td>22g</td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>2g</td>
</tr>
<tr>
<td>Sugars</td>
<td>0g</td>
</tr>
<tr>
<td><strong>Protein</strong></td>
<td>2g</td>
</tr>
</tbody>
</table>

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**Calories**
Calories are a unit of energy. Calories in food come from carbohydrates, protein, and fat. Because calories give us energy, we need them to be able to think and be active.

**% Daily Value**
This tells you the percentage of the recommended daily value for a nutrient that you get in one serving. A food that has more than 20% of the Daily Value of a certain nutrient is a good source of that nutrient.

**Cholesterol**
Cholesterol is a substance found only in animal products. Eating too much cholesterol is not healthy for your heart.

**Total Carbohydrate**
Carbohydrates give you your muscles and brain energy. Certain types of carbohydrates are sometimes listed on the label.

**Fiber**
Helps with digestion and keeps you full between meals.

**Sugars**
Give you instant energy, but eating too much added sugar can be unhealthy.

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**Servings Per Container**
This tells you how many servings you can get from one package. Some containers have a single serving, but most have more than one serving per package.

**Calories from Fat**
This is the number of calories that come from fat. It is not the percent of fat in the food.

**Total Fat**
Fat is essential in our bodies. There are 4 kinds of fat. Monounsaturated and polyunsaturated fat are the kinds of fat that are heart healthy. These kinds of fat may not be included on the food label. Saturated fat and trans fat are unhealthy for your heart, and should be limited.

**Sodium**
Sodium tells you how much salt is in the food. People with high blood pressure are sometimes told to follow a low sodium diet.

**Protein**
This nutrient is used to build muscle and fight infections.

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**Vitamins/Minerals**
This tells you the percent Daily Value for vitamin A, vitamin C, calcium, and iron you are getting from this product. Other vitamins and minerals may be included in this section.

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**Footnote**
This reminds us that all of the DailyValues come from the recommendations for a 2,000-calorie meal plan. Your needs may be higher or lower based on your height, genetics, and activity level. Keep in mind this is just an average, these daily value percentages (%) are not for everyone.
Relationship of Dietary Fats with Coronary Heart Disease Events

Compared to carbohydrate as the reference

Source: Micha & Mozaffarian, Nature Endocrine Reviews 2009
BENEFICIAL TO HUMAN HEALTH

Seafood Omega-3 PUFA

Plant Omega-3 PUFA

Plant Omega-6 PUFA

Monounsaturated Fat

Saturated Fat

Industrial Trans Fat

HARMFUL TO HUMAN HEALTH
Seafood Omega-3 PUFA

Plant Omega-3 PUFA

Plant Omega-6 PUFA

Monounsaturated Fat

1%

11%

73%

15%

Saturated Fat

Industrial Trans Fat

HARMFUL TO HUMAN HEALTH

BENEFICIAL TO HUMAN HEALTH
How does olive oil compare to other oils?

<table>
<thead>
<tr>
<th>DIETARY FAT</th>
<th>SATURATED FAT</th>
<th>POLYUNSATURATED FAT</th>
<th>MONOUNSATURATED FAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canola oil</td>
<td>7</td>
<td>21</td>
<td>11</td>
</tr>
<tr>
<td>Safflower oil</td>
<td>8</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Flaxseed oil</td>
<td>9</td>
<td>16</td>
<td>57</td>
</tr>
<tr>
<td>Sunflower oil</td>
<td>12</td>
<td>71</td>
<td>1</td>
</tr>
<tr>
<td>Corn oil</td>
<td>13</td>
<td>57</td>
<td>1</td>
</tr>
<tr>
<td>Olive oil</td>
<td>15</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Soybean oil</td>
<td>15</td>
<td>54</td>
<td>8</td>
</tr>
<tr>
<td>Peanut oil</td>
<td>19</td>
<td>33</td>
<td>*</td>
</tr>
<tr>
<td>Cottonseed oil</td>
<td>27</td>
<td>54</td>
<td>*</td>
</tr>
<tr>
<td>Lard</td>
<td>43</td>
<td>54</td>
<td>9</td>
</tr>
<tr>
<td>Palm oil</td>
<td>51</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Butter</td>
<td>68</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Coconut oil</td>
<td>91</td>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>

*Trace

Fatty acid content normalized to 100%

Source: www.CanolaInfo.org
Phenolics in Extra Virgin Olive Oil

• Phenols are phytochemicals, substances produced by olive trees to protect the tree and the fruit from environmental stress.

• Phenols like hydroxytyrosol, oleuropein, and oleocanthal found in extra virgin olive oil also affect flavor, pungency, and health benefit.

• Extra virgin olive oil is ~0.5% phenols.
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• **What are the proven benefits of including EVOO in a healthful diet?**
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As part of a healthful diet, EVOO reduces risk of heart disease.

- EVOO decreases arterial inflammation.
- EVOO reduces blood pressure.
- EVOO decreases LDL “bad” cholesterol levels.
- EVOO increases HDL “good” cholesterol levels.
The Traditional Mediterranean Diet Pyramid

Daily Beverage Recommendations:
- 6 Glasses of Water

Wine in moderation

Weekly

Monthly

MEAT

SWEETS

EGGS

POULTRY

FISH

CHEESE & YOGURT

OLIVE OIL

BEANS, LEGUMES & NUTS

FRUITS

BREAD, PASTA, RICE, COUSCOUS, POLENTA, OTHER WHOLE GRAINS & POTATOES

Daily Physical Activity

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Extra Virgin Olive Oil Reduces Inflammation in Arteries Leading to the Heart
Does simply adding EVOO to the diet reduce LDL “bad” cholesterol levels?

Possibly...but it’s best to use EVOO in place of less healthful foods or oils to get this benefit.

LARD

BUTTER
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Types of Research Studies

- Randomized, Double Blind, Placebo-Controlled Human Studies
- Human Studies
- Human Cell Culture Studies
- Animal Studies
- Prospective Epidemiological Studies
- Retrospective Epidemiological Studies
Does daily EVOO supplementation have an effect on plasma lipid levels?

- **TITLE:** Effects of extra virgin olive oil supplementation at two different low doses on lipid profile in mild hypercholesterolemic subjects: A randomised clinical trial.
- **AUTHORS:** Violante B, Gerbaudo L, Borretta G, Tassone F (Health Care Service, A.S.O.S. Croce e Carle, Via Coppino 26, 12100, Cuneo, Italy)
- **ABSTRACT:** Olive oil, the principal fat of Mediterranean Diet, is known to improve several cardiovascular risk factors at relatively high doses together with intensive modifications of dietary habits. Since this is hard to obtain in the long term, an intervention with encapsulated oil supplements might be more feasible. Aim of this preliminary study was to investigate the effects of the supplementation of a moderate amount of encapsulated extra virgin olive oil vs a lower dose in mildly hypercholesterolemic subjects, as part of their established diet, on blood lipid profile. A prospective randomized study was performed. Thirty-four mildly hypercholesterolemic subjects [age, mean+/−SD: 46+/−7yr; total cholesterol (TC): 235+/−28mg/dl] were randomly assigned to receive 2 g (group A) or 4 g (group B) per day of extra-virgin olive oil for 3 months. TC, triglycerides (TG), LDL cholesterol, HDL cholesterol, apolipoprotein A1 (Apo-A1), apolipoprotein B (Apo-B), and atherogenic index of plasma (AIP) were evaluated at the beginning and at the end of the study. In group B, but not in group A, a significant reduction of Apo-B values (7%) was observed; TG concentrations showed a trend towards reduction and Apo-A1 values a trend towards increase (9%). A significant decrease in Apo-B/Apo-A1 ratio (p<0.01) was also observed in group B. Extra virgin olive oil supplementation significantly decreased AIP from baseline in group B (p<0.05). The results of the present study seem to suggest that the daily supplementation, on top of the normal diet, of at least 4 g [less than 1 teaspoon] of extra virgin olive oil, in mildly hypercholesterolemic subjects, is associated to favorable modifications of the plasmatic lipid profile.
Does EVOO protect LDL cholesterol from oxidation?

- **JOURNAL:** J Nutr. 2010 Jan 20. [Epub ahead of print]
- **TITLE:** Elevated Circulating LDL Phenol Levels in Men Who Consumed Virgin Rather Than Refined Olive Oil Are Associated with Less Oxidation of Plasma LDL.
- **AUTHORS:** de la Torre-Carbot K, Chávez-Servín JL, Jaúregui O, Castellote AI, Lamuela-Raventós RM, Nurmi T, Poulsen HE, Gaddi AV, Kaikkonen J, Zunft HF, Kiesewetter H, Fitó M, Covas MI, López-Sabater MC (Department of Nutrition and Food Science, Reference Center in Food Technology, Faculty of Pharmacy, University of Barcelona, 08028 Barcelona, Spain)
- **ABSTRACT:** In human LDL, the bioactivity of olive oil phenols is determined by the in vivo disposition of the biological metabolites of these compounds. Here, we examined how the ingestion of 2 similar olive oils affected the content of the metabolic forms of olive oil phenols in LDL in men. The oils differed in phenol concentrations as follows: high (629 mg/L) for virgin olive oil (VOO) and null (0 mg/L) for refined olive oil (ROO). The study population consisted of a subsample from the EUROLIVE study and a randomized controlled, crossover design was used. Intervention periods lasted 3 wk and were preceded by a 2-wk washout period. The levels of LDL hydroxytyrosol monosulfate and homovanillic acid sulfate, but not of tyrosol sulfate, increased after VOO ingestion (P < 0.05), whereas the concentrations of circulating oxidation markers, including oxidized LDL (oxLDL), conjugated dienes, and hydroxy fatty acids, decreased (P < 0.05). The levels of LDL phenols and oxidation markers were not affected by ROO consumption. The relative increase in the 3 LDL phenols was greater when men consumed VOO than when they consumed ROO (P < 0.05), as was the relative decrease in plasma oxLDL (P = 0.001) and hydroxy fatty acids (P < 0.001). Plasma oxLDL concentrations were negatively correlated with the LDL phenol levels (r = -0.296; P = 0.013). Phenols in LDL were not associated with other oxidation markers. In summary, the phenol concentration of olive oil modulates the phenolic metabolite content in LDL after sustained, daily consumption. The inverse relationship of these metabolites with the degree of LDL oxidation supports the in vivo antioxidant role of olive oil phenolics compounds.
Does EVOO reduce blood pressure?

- **TITLE:** Olive oil and reduced need for antihypertensive medications.
- **AUTHORS:** Ferrara LA, Raimondi AS, d’Episcopo L, Guida L, Dello Russo A, Marotta T (Department of Clinical and Experimental Medicine, Federico II University of Naples, Italy. ferrara@unina.it)
- **ABSTRACT:** BACKGROUND: The blood pressure (BP) effects of changing the total fat intake and saturated-unsaturated fat ratio are still controversial, despite evidence that saturated fat-enriched diets are associated with higher BP levels. This double-blind, randomized crossover study evaluated a possible difference between antihypertensive effects of monounsaturated (MUFA) (extra-virgin olive oil) and polyunsaturated fatty acids (PUFA) (sunflower oil). METHODS: Twenty-three hypertensive patients were assigned randomly to MUFA or PUFA diet for 6 months and then crossed over to the other diet; effects were evaluated on the basis of daily antihypertensives needed. RESULTS: Diets high in MUFA and PUFA differed from the habitual diet for reduced total and saturated fats, whereas they differed from each other for MUFA (17.2% vs 10.5%) and PUFA content (3.8% vs 10.5%). Resting BP was significantly lower (P = .05 for systolic BP; P = .01 for diastolic BP) at the end of the MUFA diet compared with the PUFA diet. Blood pressure responses during sympathetic stimulation with the cold pressor test and isometric exercise were similar. Daily drug dosage was significantly reduced during the MUFA but not the PUFA diet (-48% vs -4%, P<.005). All patients receiving the PUFA diet required antihypertensive treatment, whereas 8 of those receiving the MUFA diet needed no drug therapy. CONCLUSIONS: A slight reduction in saturated fat intake, along with the use of extra-virgin olive oil, markedly lowers daily antihypertensive dosage requirement, possibly through enhanced nitric oxide levels stimulated by polyphenols.
Does adding EVOO to the diet cause weight gain?

- **JOURNAL:** Arch Intern Med. 2008 Dec 8;168(22):2449-58.
- **TITLE:** Effect of a Mediterranean diet supplemented with nuts on metabolic syndrome status: one-year results of the PREDIMED randomized trial.
- **AUTHORS:** Salas-Salvadó J, Fernández-Ballart J, Ros E, Martínez-González MA, Fitó M, Estruch R, Corella D, Fiol M, Gómez-Gracia E, Arós F, Flores G, Lapetra J, Lamuela-Raventós R, Ruiz-Gutiérrez V, Bulló M, Basora J, Covas MI; PREDIMED Study Investigators (Human Nutrition Unit, School of Medicine, University of Rovira i Virgili, Reus, Spain. jordi.salas@urv.cat)
- **ABSTRACT:** BACKGROUND: Epidemiological studies suggest that the Mediterranean diet (MedDiet) may reduce the risk of developing the metabolic syndrome (MetS). We compared the 1-year effect of 2 behavioral interventions to implement the MedDiet vs advice on a low-fat diet on MetS status. METHODS: A total of 1224 participants were recruited from the PREDIMED (Prevención con Dieta Mediterránea) Study, a multicenter, 3-arm, randomized clinical trial to determine the efficacy of the MedDiet on the primary prevention of cardiovascular disease. Participants were older subjects at high risk for cardiovascular disease. Interventions were quarterly education about the MedDiet plus provision of either 1 L/wk of extra virgin olive oil (MedDiet + VOO) or 30 g/d of mixed nuts (MedDiet + nuts), and advice on a low-fat diet (control diet). All diets were ad libitum, and there was no increase in physical activity for any of the interventions. Lifestyle variables and MetS features as defined by the National Cholesterol Education Program Adult Treatment Panel III criteria were assessed. RESULTS: At baseline, 61.4% of participants met criteria for the MetS. One-year prevalence was reduced by 6.7%, 13.7%, and 2.0% in the MedDiet + VOO, MedDiet + nuts, and control diet groups, respectively (MedDiet + nuts vs control groups, P = .01; MedDiet + VOO vs control group, P = .18). Incident rates of the MetS were not significantly different among groups (22.9%, 17.9%, and 23.4%, respectively). After adjustment for sex, age, baseline obesity status, and weight changes, the odds ratios for reversion of MetS were 1.3 (95% confidence interval, 0.8-2.1) for the MedDiet + VOO group and 1.7 (1.1-2.6) for the MedDiet + nuts group compared with the control diet group. CONCLUSION: A traditional MedDiet enriched with nuts could be a useful tool in the management of the MetS.
Does EVOO have an effect on endothelial cell function?

- **TITLE:** Effect of extra virgin olive oil on experimental thrombosis and primary hemostasis in rats.
- **AUTHORS:** Brzosko S, De Curtis A, Murzilli S, de Gaetano G, Donati MB, Iacoviello L (Department of Nephrology and Internal Medicine, Bialystok Medical University, Bialystok, Poland)
- **ABSTRACT:** BACKGROUND AND AIM: Olive oil is a particular source of fat in the Mediterranean diet, which is associated with a lower incidence of cardiovascular disease. We investigated the possible antithrombotic role of extra virgin olive oil as a single dietary modification in experimental thrombosis and primary hemostasis models in rats. METHODS AND RESULTS: Two different groups of ANIMALS were studied: one fed a usual diet (control group) and the other a diet enriched with extra virgin olive oil (3%; weight/weight). After six weeks feeding, arterial thrombosis was initiated by inserting an artificial prosthesis (or "aortic loop") into the aorta, and venous thrombosis was induced by ligating the inferior vena cava. "Template" bleeding time (BT) was measured, as well as factor VII coagulant activity (FVII:C) and fibrinogen levels. The animals fed the olive oil enriched diet showed a significant delay in the thrombotic occlusion of the "aortic loop" (99 +/- 5 h vs 82 +/- 5 h, p < 0.04), a lower incidence of venous thrombosis (57% vs 86%; p < 0.05) and a prolonged BT (154 +/- 7 sec vs 122 +/- 4 sec; p < 0.01) in comparison with the control group. They had lower plasma fibrinogen concentrations (209 +/- 5 mg/dL vs 233 +/- 4 mg/dL; p < 0.01) but similar FVII:C levels (119 +/- 5% vs 108 +/- 5%; p = NS) despite their lower triglyceride concentrations (52 +/- 5 mg/dL vs 79 +/- 10 mg/dL; p < 0.05). CONCLUSIONS: This study provides the first in vivo experimental evidence of the thrombosis prevention properties of extra virgin olive oil, which are possibly mediated by reduced fibrinogen concentrations and impaired platelet/vessel wall interactions.
Does EVOO have an anxiety-lowering effect?

- **JOURNAL:** British Journal of Nutrition. 2010 Jan 14:1-10. [Epub ahead of print]
- **TITLE:** Effects of dietary extra-virgin olive oil on behaviour and brain biochemical parameters in ageing rats.
- **ABSTRACT:** The aim of the present study was to verify whether extra-virgin olive oil, a dietary component naturally containing phenolic antioxidants, has the potential to protect the brain from the deleterious effects of ageing. To accomplish this goal, we used male RATS fed a high-energy diet containing either maize oil, or extra-virgin olive oil with high or low phenol content (720 or 10 mg total phenols/kg oil, corresponding to a daily dose of 4 or 0.05 mg total phenols/kg body weight, respectively) from age 12 months to senescence. The measured endpoints were biochemical parameters related to oxidative stress and functional tests to evaluate motor, cognitive and emotional behaviour. Olive oil phenols did not exert major protective actions on motor and cognitive function, as we observed only a tendency to improved motor coordination on the rotarod in the old animals treated with the oil rich in phenols (40 % average increase in the time to first fall; P = 0.18). However, an interesting finding of the present study was a reduced step-through latency in the light-dark box test, found in the older animals upon treatment with the oil rich in antioxidant phenols, possibly indicating an anxiety-lowering effect. This effect was associated with decreased glutathione reductase activity and expression in the brain, a phenomenon previously associated with decreased anxiety in rodents. These results indicate a previously undetected effect of a diet containing an olive oil rich in phenols. Further studies are warranted to verify whether specific food antioxidants might also have an effect on emotional behaviour.
Does EVOO have a chemopreventive effect on breast cancer?

- **JOURNAL:** Carcinogenesis. 2009 Oct 13. [Epub ahead of print]
- **TITLE:** Dietary olive oil and corn oil differentially affect experimental breast cancer through distinct modulation of the p21ras signaling and the proliferation-apoptosis balance.
- **AUTHORS:** Solanas M, Grau L, Moral R, Vela E, Escrich R, Escrich E. (Department of Cell Biology, Physiology and Immunology, Medical Physiology Unit. Medicine School, Universitat Autònoma de Barcelona. 08193 Bellaterra, Barcelona, Spain)
- **ABSTRACT:** Extra-virgin olive oil (EVOO) has been hypothesized to have chemopreventive effects on breast cancer, unlike high corn oil (HCO) diets which stimulate it. We have investigated mechanisms of these differential modulatory actions on experimental mammary cancer. In dimethylbenz(alpha)anthracene-induced breast adenocarcinomas of RATS fed a high EVOO, HCO and control diets (n = 20 for each group), we have analyzed the expression and activity of ErbB receptors, p21Ras and its ERK1/2, Akt and RafA/B effectors by immunoblotting analyses. We explored the Ha-ras1 mutation status by Southern blot, MAMA and sequencing, and the HMG-CoA reductase and squalene synthase mRNA expression by Real Time-polymerase chain reaction (PCR). We analyzed the tumor mitotic index, PCNA levels, and apoptosis through Caspase-3 analysis and TUNEL assays. Finally, we measured the 8-oxo-2'-deoxyguanosine levels. Non-parametrical statistics were used. The EVOO diet decreased Ras activation, down-regulated the Ras/PI3K/Akt pathway and up-regulated the Raf/Erk pathway, compared to the control. In contrast, the HCO diet did not modify Ras activity but rather enhanced the Raf/Erk pathway. The EVOO diet decreased the cleaved ErbB4 levels, compared to the HCO diet, increased apoptosis and diminished the mono-ubiquitylated PCNA levels, which is related to DNA damage. Tumors from rats fed the EVOO diet displayed a more benign phenotype, whereas those from rats fed the HCO diet were biologically more aggressive. In conclusion, high EVOO and corn oil diets exert their modulatory effects on breast cancer through a different combination of Ras signaling pathways, a different proliferation/apoptosis balance and probably distinct levels of DNA damage.
Does EVOO have a chemopreventive effect on breast cancer?

- **TITLE**: Characterization and quantification of phenolic compounds of extra-virgin olive oils with anticancer properties by a rapid and resolutive LC-ESI-TOF MS method.
- **AUTHORS**: García-Villalba R, Carrasco-Pancorbo A, Oliveras-Ferraros C, Vázquez-Martín A, Menéndez JA, Segura-Carretero A, Fernández-Gutiérrez A (Department of Analytical Chemistry, Faculty of Sciences, University of Granada, c./Fuentenueva s/n, E-18071 Granada, Spain)
- **ABSTRACT**: The characterization and quantification of extra-virgin olive oil (EVOO) phenolic compounds by a rapid resolution liquid chromatography (RRLC) method coupled to diode-array and time of flight mass spectrometry (TOF) detection systems was developed. The RRLC method transferred from a conventional HPLC one achieved better performance with shorter analysis times. The phenolic compounds were separated with a C18 column (150 mm x 4.6mm, 1.8 microm) using water with 0.5% acetic acid and acetonitrile as mobile phases. Good peak resolution was obtained and 19 different phenols were identified in less than 20 min providing a new level of information about the samples in shorter time. The applicability of this analytical approach was confirmed by the successful analysis of three different EVOO varieties (Picual, Hojiblanca, and Arbequina) obtained from different trademarks. Besides identification of the most important phenolic compounds and their quantification in three different ways (RRLC-UV, RRLC-MS and a new approach using the total polyphenol content obtained with Folin Ciocalteau, the relative areas and the response factors), we also described the occurrence of correlations between the phenolic composition of EVOO-derived crude phenolic extracts and their anti-proliferative abilities toward human breast cancer-derived cell lines. When compared with lignans-rich EVOO varieties, secoiridoids-rich EVOO had a significantly strong ability to alter cell viability in four different types of human breast carcinoma cells.
Does EVOO reduce risk of Alzheimer’s disease?

- **TITLE:** Alzheimer's-associated a-beta oligomers show altered structure, immunoreactivity and synaptotoxicity with low doses of oleocanthal.
- **AUTHORS:** Pitt J, Roth W, Lacor P, Smith AB 3rd, Blankenship M, Velasco P, De Felice F, Breslin P, Klein WL (Department of Neurobiology and Physiology, Northwestern University, Evanston, IL 60208, USA. jasonpitt@u.northwestern.edu)
- **ABSTRACT:** It now appears likely that soluble oligomers of amyloid-beta1-42 peptide, rather than insoluble fibrils, act as the primary neurotoxin in Alzheimer's disease (AD). Consequently, compounds capable of altering the assembly state of these oligomers (referred to as ADDLs) may have potential for AD therapeutics. Phenolic compounds are of particular interest for their ability to disrupt a-beta oligomerization and reduce pathogenicity. This study has focused on oleocanthal (OC), a naturally-occurring phenolic compound found in extra-virgin olive oil. OC increased the immunoreactivity of soluble Abeta species, when assayed with both sequence- and conformation-specific Abeta antibodies, indicating changes in oligomer structure. Analysis of oligomers in the presence of OC showed an upward shift in MW and a ladder-like distribution of SDS-stable ADDL subspecies. In comparison with control ADDLs, oligomers formed in the presence of OC (Abeta-OC) showed equivalent colocalization at synapses but exhibited greater immunofluorescence as a result of increased antibody recognition. The enhanced signal at synapses was not due to increased synaptic binding, as direct detection of fluorescently-labeled ADDLs showed an overall reduction in ADDL signal in the presence of OC. Decreased binding to synapses was accompanied by significantly less synaptic deterioration assayed by drebrin loss. Additionally, treatment with OC improved antibody clearance of ADDLs. These results indicate oleocanthal is capable of altering the oligomerization state of ADDLs while protecting neurons from the synaptopathological effects of ADDLs and suggest OC as a lead compound for development in AD therapeutics.
Does EVOO reduce risk of Type II diabetes?

- **JOURNAL**: J Nutr Biochem. 2009 Jul 17. [Epub ahead of print]
- **TITLE**: Oleuropein aglycon prevents cytotoxic amyloid aggregation of human amylin.
- **AUTHORS**: Rigacci S, Guidotti V, Bucciantini M, Parri M, Nediani C, Cerbai E, Stefani M, Berti A (Department of Biochemical Sciences, University of Florence, Viale Morgagni 50, 50134 Florence, Italy)
- **ABSTRACT**: Pancreatic amyloid deposits of amylin are a hallmark of Type II diabetes and considerable evidence indicates that amylin oligomers are cytotoxic to beta-cells. Many efforts are presently spent to find out naturally occurring molecules, or to design synthetic ones, able to hinder amylin aggregation or to protect cells against aggregate cytotoxicity. In this context, a protective effect of some polyphenols against amyloid cytotoxicity was reported. Actually dietary polyphenols are endowed with multiple health benefits, and extra virgin olive oil is attracting increasing interest as a source of these substances. Here, we investigated the effects on amylin aggregation and cytotoxicity of the secoiridoid oleuropein aglycon, the main phenolic component of extra virgin olive oil. We found that oleuropein, when present during the aggregation of amylin, consistently prevented its cytotoxicity to RIN-5F pancreatic beta-cells, as determined by the 3-[4,5-dimethylthiazol-2-yl]-2,5-diphenyl tetrazolium bromide test and caspase-3 activity assay. A lack of interaction with the cell membrane of amylin aggregates grown in the presence of oleuropein was shown by fluorescence microscopy and synthetic lipid vesicle permeabilization. Moreover, our ThT assay, circular dichroism analysis and electron microscopy images suggested that oleuropein interferes with amylin aggregation, resulting in a different path skipping the formation of toxic prefibrillar aggregates. These results provide a molecular basis for some of the benefits potentially coming from extra virgin olive oil consumption and pave the way to further studies on the possible pharmacological use of oleuropein to prevent or to slow down the progression of type II diabetes.
Can EVOO reduce risk of rheumatoid arthritis?


**TITLE:** [The mediterranean diet model in inflammatory rheumatic diseases]

**AUTHORS:** Sales C, Oliviero F, Spinella P (Servizio di Dietetica e Nutrizione Clinica, Dipartimento di Medicina Clinica e Sperimentale, Università degli Studi di Padova, Padova, Italia)

**ABSTRACT:** The Mediterranean diet is based on a pattern of eating closely tied to the Mediterranean region, which includes Greece and southern Italy. Essentially, the traditional diet emphasizes foods from plant sources, limited meat consumption, small amounts of wine, and olive oil as the main fat source. The beneficial effects of the Mediterranean diet have been proven not only to cardiovascular diseases but also for diabetes, obesity, arthritis, and cancer. Its anti-inflammatory and protective properties are linked to the large presence of omega-3 polyunsaturated fatty acids, vitamins, but especially to the constituents of *extra virgin olive oil*: oleic acid, phenolic compounds oleocanthal, a new recently discovered molecule, with natural anti-inflammatory properties. It has been shown that *the Mediterranean diet can reduce disease activity, pain and stiffness in patients with inflammatory arthritis and may thus constitute a valuable support for patients suffering from these diseases.*
Can EVOO slow the aging process in overweight/obese individuals?

- **JOURNAL:** J Nutr Biochem. 2009 Apr 13. [Epub ahead of print]
- **TITLE:** Dietary extra-virgin olive oil rich in phenolic antioxidants and the aging process: long-term effects in the rat.
- **AUTHORS:** Jacomelli M, Pitozzi V, Zaid M, Larrosa M, Tonini G, Martini A, Urbani S, Taticchi A, Servili M, Dolara P, Giovannelli L (Department of Preclinical and Clinical Pharmacology, University of Florence, Italy)
- **ABSTRACT:** The aim of the present work was to verify whether extra-virgin olive oil, a food naturally containing phenolic antioxidants, has the potential to protect from the pro-aging effects of a high-calorie diet. Male RATS were fed from age 12 months to senescence a high-calorie diet containing either corn oil (CO), or extra-virgin olive oil with high (H-EVOO) or low (L-EVOO) amounts of phenols. The prolonged high fat intake led to obesity, liver lipid degeneration and insulin resistance, which were not counteracted by high phenol intake. No difference in overall survival was found at the end of the experiment in the animals treated with H-EVOO compared to the other groups. However, we did detect a protective effect of extra virgin olive oil on some age-related pathologies and on blood pressure, of which the former was associated with the antioxidant content. Concomitantly, a decrease in DNA oxidative damage in blood cells and plasma TBARS and an increase in liver superoxide dismutase were detected following H-EVOO consumption. Thus, although olive oil phenols cannot reverse the detrimental effects of a prolonged intake of high amounts of fat, improving the quality of olive oil in terms of antioxidant content can be beneficial.
Today’s Topics

• Why is extra virgin olive oil so special?
• What are the proven benefits of including EVOO in a healthful diet?
• What are the areas of emerging science?
• **What are claims that can be made?**
• What are claims to avoid?
Types of Claims That Can Be Made on Food Products Sold in the U.S.

• **Health Claims**
  – NLEA Authorized Health Claims
  – Health Claims Based on Authoritative Statements
  – Qualified Health Claims*

• **Nutrient Content Claims**
  – Example: *Excellent source of calcium.*

• **Structure-Function Claims**
  – Example: *Calcium builds strong bones.*
Qualified Health Claim for Olive Oil

- Limited and not conclusive scientific evidence suggests that eating about 2 tablespoons (23 grams) of olive oil daily may reduce the risk of coronary heart disease due to the monounsaturated fat in olive oil. To achieve this possible benefit, olive oil is to replace a similar amount of saturated fat and not increase the total number of calories you eat in a day. One serving of this product [Name of food] contains [x] grams of olive oil.
Qualified Health Claim for Olive Oil

• **Limited and not conclusive scientific evidence** suggests that eating about 2 tablespoons (23 grams) of olive oil daily may reduce the risk of coronary heart disease due to the monounsaturated fat in olive oil. To achieve this possible benefit, olive oil is to replace a similar amount of saturated fat and not increase the total number of calories you eat in a day. One serving of this product [Name of food] contains [x] grams of olive oil.
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Qualified Health Claim for Olive Oil

• Limited and not conclusive scientific evidence suggests that eating about 2 tablespoons (23 grams) of olive oil daily may reduce the risk of coronary heart disease due to the monounsaturated fat in olive oil. To achieve this possible benefit, **olive oil is to replace a similar amount of saturated fat** and not increase the total number of calories you eat in a day. One serving of this product [Name of food] contains [x] grams of olive oil.
All products that are essentially pure olive oil and labeled as such (see * for definitions) will comply with the requirement to be labeled in the manner described above. Olive oil and vegetable oil spreads, dressings for salads, shortenings and olive-oil containing foods do not need to comply with the total fat qualifying level in 21 CFR 101.14(a)(4). The requirement that the food comply with the 50 gram-criterion of the saturated fat qualifying level (21 CFR 101.14(e)(3)) does not apply to olive oil, vegetable oil spreads, and shortenings. The requirement that the food contain a minimum of 10 percent of the Daily Value per RACC of one of the following: vitamin A, vitamin C, iron, calcium, protein or dietary fiber per RACC (21 CFR 101.14(e)(6)) does not apply to olive oil, dressings for salads, and shortenings. When the total fat qualifying level is exceeded in vegetable oil spreads, dressings for salads, shortenings, or olive-oil containing foods the disclosure statement (i.e., See nutrition information for saturated fat content) must be placed immediately following the claim, with no intervening material, in the same size, typeface, and contrast as the claim itself. When the food does not meet the definition of low saturated fat (21 CFR 101.62(c)(2)) the disclosure statement (i.e., See nutrition information for saturated fat content) must be placed immediately following the claim, with no intervening material, in the same size, typeface, and contrast as the claim itself. If both of the above two conditions are met the disclosure statements for total fat and saturated fat can be combined (i.e., See nutrition information for total and saturated fat content).

Limited and not conclusive scientific evidence suggests that eating about 2 tablespoons (23 grams) of olive oil daily may reduce the risk of coronary heart disease due to the monounsaturated fat in olive oil. To achieve this possible benefit, olive oil is to replace a similar amount of saturated fat and not increase the total number of calories you eat in a day. One serving of this product contains [x] grams of olive oil.

Note: The last sentence of the claim “One serving of this product contains [x] grams of olive oil,” is optional when the claim is used on the label or in the labeling of olive oil.

1 Olive oil means virgin olive oil, or blends of virgin olive oil and refined olive oil; where virgin olive oil is the oil resulting from the first pressing of olives and is suitable for human consumption without further processing and refined olive oil is the oil obtained from subsequent pressings and which is suitable for human consumption by refining processes which neutralize the acidity or remove particulate matter. (2) Vegetable oil spread means margarine (21 CFR 166.110) and margarine-like products. (3) "dressings for salads" means dressings for salads formulated to contain olive oil. (4) "shortenings" means vegetable oil shortenings, formulated to contain olive oil. (5) Olive oil-containing foods means foods, such as sauces or
Other Claims That *Can* Be Made

based on a RACC (reference amount commonly consumed) of 1 tablespoon

• **NUTRIENT CONTENT CLAIMS**
  – Extra virgin olive oil is a *cholesterol-free* food.
  – Extra virgin olive oil is a *sodium-free* food.
Other Information That’s Good to Share

• Q: Is it okay/safe to cook with extra virgin olive oil?
  A: YES! The heat will destroy some of the health-promoting phenols in the oil, which will change the flavor. The longer the oil is exposed to heat, and the higher the heat, the more phenols will be destroyed. Sautéing in extra virgin olive oil for 5-10 minutes over medium heat will have minimal effects on phenols and flavor.

• Q: Where should I store my extra virgin olive oil?
  A: In a cool, dark environment, like a kitchen cabinet, just not one near the stove. Fluctuations in temperature and light affect the integrity of the health-promoting phenols in extra virgin olive oil. Storing your oil on the shelf above your stove is the worst place to store it.
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Claims to Avoid

unless you have good lawyers and don’t mind being bothered by the FDA or FTC

• Claims for antioxidants.
  – *Extra virgin olive is an excellent source of health-promoting antioxidants.*

• Claims that use the word “treat(s)”
  – *Extra virgin olive oil treats skin cancer.*

• Claims that use the word “prevent(s)”
  – *Extra virgin olive oil prevents diabetes.*

• Claims that are not truthful and misleading.
  – *Research shows that people who consume extra virgin olive oil are smarter and more beautiful than people who consume other oils.*
Extra Virgin Olive Oil Health Benefits:
A Closer Look at the Latest Research and Valid Claims

Presented at:
2010 California Olive Oil Council Annual Meeting
February 20, 2010
Sonoma, California

Presented by:
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