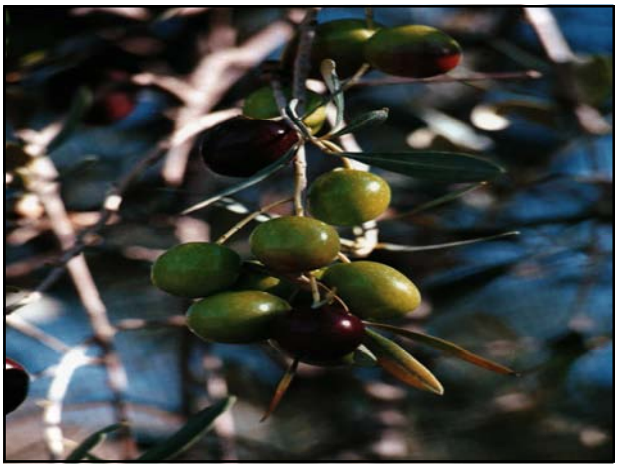
Η διατροφική αξία της κατανάλωσης του ελαιολάδου και η δράση του στα καρδιαγγειακά νοσήματα

Αντώνης Ζαμπέλας
Καθηγητής Διατροφής του Ανθρώπου

Πρόεδρος,
Τμήμα Επιστήμης Τροφίμων & Διατροφής του Ανθρώπου
Γεωπονικό Πανεπιστήμιο Αθηνών

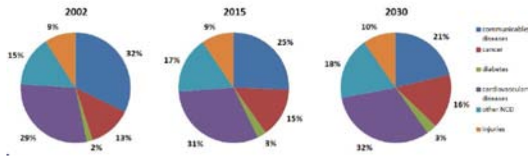
UNIVERSITY OF NICOSIA
ΠΑΝΕΠΙΣΤΗΜΙΟ ΛΕΥΚΩΣΙΑΣ
Τμήμα Υγείας και Επιστημών



Cardiovascular disease is a leading cause of mortality world wide

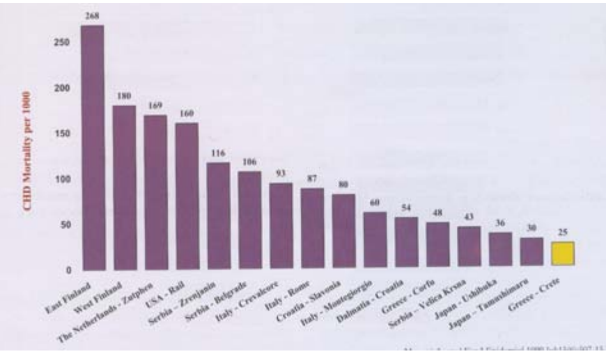
17.3 million deaths worldwide from CVD in 2008[1]
- 7.3 million deaths from **coronary heart disease**
- 6.2 million deaths from **stroke**

...AND IS PREDICTED TO STAY SO [2]



1. WHO Global atlas of CVD prevention and Control, 2011
2. WHO Global Burden of Disease, 2008

Age standardized 25-year mortality per 1000 from CHD in 16 cohorts of the 7 Countries Study



Menotti A et al Eur J Epidemiol 1999;15:507-15

Linear correlation coefficients among simple and combined food-groups and mortality from CHD

	R	95% CI	
Oils	-0.571	-0.825	-0.086
Butter	0.887	0.683	0.958
Meat	0.645	0.199	0.859
Fish	-0.279	-0.676	0.260
Milk	0.600	0.129	0.839
Cheese	0.407	-0.124	0.745
Alcohol	-0.609	-0.843	-0.142
Bread	-0.001	-0.496	0.495
Cereals	-0.305	-0.688	0.238
Potatoes	0.464	-0.057	0.774
Vegetables	-0.228	-0.646	0.309
Legumes	-0.822	-0.933	-0.531
Fruit	0.118	-0.404	0.577

Menotti A et al Eur J Epidemiol 1999;15:507-15

Predicted changes in death rates from CHD for defined changes in food consumption, assuming causation

Change in average consumption of	From about (g)	To about (g)	Predicted changes of CHD death rate (%)
Oils	25	55 (+ 30 g)	- 18.3
Legumes	24	54 (+ 30 g)	- 28.2
Butter	14	44 (+ 30 g)	+ 52.6
Meat	120	70 (- 50 g)	- 24.4
Cheese	30	60 (+ 30 g)	+ 9.5
Meat in US Railroad	273	121 (- 152 g)	- 57.5
Sugar products	35	20 (- 15 g)	- 18.6
Dairy products	80	40 (half)	- 20.4
Butter in East Finland	88	44 (half)	- 22.8

Menotti A et al Eur J Epidemiol 1999;15:507-15

Odds ratios (OR) (95% CI) of a first myocardial infarction according to olive oil intake (unadjusted for total energy intake)

Quintile	Controls/cases (n)	Median intake (g/day)	Multivariate adjusted OR[a] (95% CI)	Multivariate Adjusted OR[b] (95% CI)
1	32/36	7.2	1	1
2	35/37	12	1.17 (0.46-3.02)	1.16 (0.46-2.95)
3	36/30	25.0	0.69 (0.28-1.67)	0.60 (0.24-1.49)
4	31/39	29.3	0.91 (0.38-2.18)	0.83 (0.34-2.01)
5	37/29	54.3	0.36 (0.12-1.08)	0.26 (0.08-0.85)
Trend test P-value			0.05	0.02

[a] conditional logistic regression (age-, hospital- and gender-matched pairs), adjusted for smoking, BMI, high blood pressure, high blood cholesterol, diabetes, leisure-time physical activity (METS-hours/week), marital status, occupation and study level.

[b] additionally adjusted for saturated fat, trans fat and total fibre intake

Fernadez-Jarne E et al Intern J Epidemiol 2002;31:474-80

Odds ratios (OR) (95% CI) of a first myocardial infarction according to energy adjusted olive oil intake

Quintile	Controls/cases (n)	Median intake (g/day)	Multivariate adjusted OR[a] (95% CI)	Multivariate Adjusted OR[b] (95% CI)
1	28/40	6.1	1	1
2	38/31	13.6	0.39 (0.15-1.00)	0.45 (0.16-1.25)
3	38/30	21.0	0.40 (0.17-0.93)	0.44 (0.18-1.07)
4	29/40	30.9	0.59 (0.23-1.52)	0.70 (0.24-2.02)
5	38/30	52.2	0.22 (0.07-0.67)	0.18 (0.05-0.63)
Trend test P-value			0.03	0.03

[a] conditional logistic regression (age-, hospital- and gender-matched pairs), adjusted for smoking, BMI, high blood pressure, high blood cholesterol, diabetes, leisure-time physical activity (METS-hours/week), marital status, occupation and study level.

[b] additionally adjusted for % energy derived from SFA, % energy derived from trans fat, total fibre comsumption, folic acid intake, vitamin C intake, glycaemic load and ethanol intake (adding a quadratic term for non-linearity)

Fernadez-Jarne E et al Intern J Epidemiol 2002;31:474-80

Fruit, vegetables, and olive oil and risk of coronary heart disease in Italian women: the EPICOR Study

- ***Objective***: Association between consumption of fruit, vegetables, and olive oil and the incidence of coronary heart disease (CHD) in 29,689 women enrolled between 1993 and 1998 in 5 European Prospective Investigation into Cancer and Nutrition (EPIC) cohorts in northern (Turin and Varese), central (Florence), and southern (Naples and Ragusa) Italy.
- ***Design***: Major events of CHD (fatal and nonfatal myocardial infarction and coronary revascularization) were identified through a review of clinical records.
- ***Results***: During a mean follow-up of 7.85 y, 144 major CHD events were identified. A strong reduction in CHD risk among women in the highest quartile of consumption of leafy vegetables (hazard ratio: 0.54; 95% CI: 0.33, 0.90; P for trend = 0.03) and olive oil (hazard ratio: 0.56; 95% CI: 0.31, 0.99; P for trend = 0.04) was found

Berdinelli B et al Am J Clin Nutr 2011;93:275–83

Olive oil intake and mortality within the Spanish population (EPIC-Spain)[1–3]

Genevieve Buckland, Ana Lucia Mayén, Antonio Agudo, Noemie Travier, Carmen Navarro, José María Huerta, María Dolores Chirlaque, Aurelio Barricarte, Eva Ardanaz, Conchi Moreno-Iribas, Pilar Marín, J Ramón Quirós, María-Luisa Redondo, Pilar Amiano, Miren Dorronsoro, Larraitz Arriola, Esther Molina, María-José Sanchez, and Carlos A Gonzalez

Objective: The association between olive oil and overall and cause-specific mortality in the Spanish population in the European Prospective Investigation into Cancer and Nutrition (EPIC-Spain) was evaluated.

Design: A total of 40,622 participants (62% female) aged 29–69 y were recruited from 5 Spanish regions in 1992–1996. The association between olive oil (analyzed as a categorical and continuous variable) and overall and cause-specific mortality (CVD, cancer, and other causes) was analyzed by using Cox proportional hazards regression models adjusted for potential confounders.

Buckland G et al Am J Clin Nutr 2012;96:142–9

Association [HR (95% CI)] between olive oil intake and all-cause and cause-specific mortality in the EPIC-Spain cohort[1]

	Olive oil intake (g · 2000 kcal^{-1} · d^{-1})						
Mortality cause[2]	Nonconsumers	Q1 (<14.8)	Q2 (≥14.8 to <21.7)	Q3 (≥21.7 to <29.4)	Q4 (≥29.4)	P-trend	Olive oil intake (10 g · 2000 kcal^{-1} · d^{-1})
All-cause deaths (n)	376	426	373	378	362		1915
Unadjusted HR[3]	1 (referent)	0.85 (0.74, 0.98)	0.80 (0.69, 0.93)	0.77 (0.67, 0.90)	0.72 (0.62, 0.84)	<0.001	0.93 (0.90, 0.96)
Multivariate HR[4]	1 (referent)	0.88 (0.76, 1.01)	0.83 (0.71, 0.96)	0.80 (0.69, 0.93)	0.74 (0.64, 0.87)	<0.001	0.93 (0.90, 0.97)
CVD deaths (n)	92	98	80	78	68		416
Unadjusted HR[3]	1 (referent)	0.81 (0.60, 1.08)	0.72 (0.53, 0.98)	0.68 (0.50, 0.93)	0.56 (0.41, 0.78)	<0.001	0.87 (0.81, 0.94)
Multivariate HR[4]	1 (referent)	0.87 (0.64, 1.17)	0.77 (0.56, 1.06)	0.71 (0.52, 0.98)	0.56 (0.40, 0.79)	<0.001	0.87 (0.80, 0.94)
Cancer deaths (n)	172	210	182	200	192		956
Unadjusted HR[3]	1 (referent)	0.98 (0.79, 1.20)	0.90 (0.73, 1.12)	0.95 (0.77, 1.17)	0.88 (0.71, 1.08)	0.208	0.98 (0.93, 1.03)
Multivariate HR[4]	1 (referent)	0.99 (0.80, 1.22)	0.92 (0.74, 1.15)	0.97 (0.78, 1.20)	0.90 (0.72, 1.13)	0.361	0.98 (0.93, 1.04)
Other deaths (n)	97	93	80	72	75		417
Unadjusted HR[3]	1 (referent)	0.74 (0.55, 1.00)	0.69 (0.50, 0.93)	0.59 (0.43, 0.80)	0.59 (0.44, 0.81)	<0.001	0.87 (0.81, 0.94)
Multivariate HR[4]	1 (referent)	0.75 (0.56, 1.02)	0.71 (0.52, 0.97)	0.60 (0.44, 0.82)	0.62 (0.44, 0.85)	0.001	0.87 (0.80, 0.94)

[1] CVD, cardiovascular disease; EPIC, European Prospective Investigation into Cancer and Nutrition; Q, quartile.
[2] Cause-specific mortality excluded 126 cases with no information on cause of death.
[3] Cox proportional hazards regression analysis stratified by center, age, and sex.
[4] Cox proportional hazards regression analysis stratified by center, age, and sex and adjusted for physical activity, BMI, waist circumference, educational level, smoking status, and intake of energy, alcohol, fruit, vegetables, meat, and dairy.

Buckland G et al Am J Clin Nutr 2012;96:142–9

The Impact of Olive Oil Consumption Pattern on the Risk of Acute Coronary Syndromes: The Cardio2000 Case–Control Study.

MEROPI D. KONTOGIANNI, PH.D.[a] DEMOSTHENES B. PANAGIOTAKOS, PH.D.[a] CHRISTINA CHRYSOHOOU, M.D. PH.D.[b] CHRISTOS PITSAVOS[b], M.D. PH.D. ANTONIS ZAMPELAS, PH.D.[a] CHRISTODOULOS STEFANADIS, M.D. PHD[b]
[a]Department of Nutrition & Dietetics, Harokopio University of Athens, Athens, Greece; [b]First Cardiology Clinic, School of Medicine, University of Athens, Athens, Greece

- Seven hundred males and 148 females patients with first event of an ACS and 1078 population based controls, age and sex matched, were randomly selected.
- Detailed information regarding their medical records, alcohol intake, physical activity and smoking habits was recorded.
- Nutritional habits were evaluated with a semi-quantitative food-frequency questionnaire and use of oils in daily cooking or preparation of food was also recorded.
- Multiple logistic regression analysis estimated the odds ratio (OR) of having ACS by types of oil used, after taking into account the effect of several confounders.

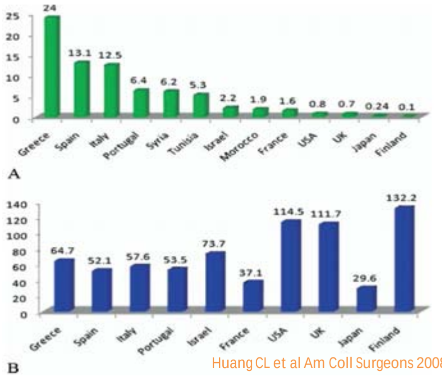
Kontogianni M et al Clin Cardiol 2007;30:125-9

Odds ratios (95% confidence interval) for nonfatal acute coronary syndromes associated with pattern of olive oil consumption

	OR	95% CI		P
Oil category				
No use of olive oil (reference category)	1	-	-	
Exclusive use of olive oil	0.53	0.34	0.71	<0.001
Olive plus other oils or fats	0.77	0.54	1.09	0.14
Red meat intake (servings/week)	1.68	1.40	2.03	<0.001
Fruits and vegetables intake (servings/week)	0.66	0.57	0.76	0.001
Cereals intake (servings/week)	1.15	0.98	1.33	0.06
Alcohol intake (wineglasses/day	1.09	0.97	1.22	0.14

Kontogianni M et al Clin Cardiol 2007;30:125-9

(A) Per capita consumption of olive oil in selected countries (Olive Oil Council Data).
(B) Rates of coronary heart disease mortality according to the World Health Organization standard (Cardiovascular Disease Infobase).

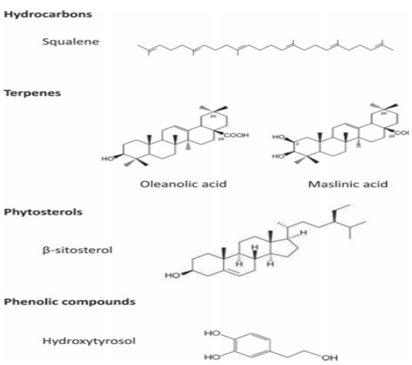


Huang CL et al Am Coll Surgeons 2008;207:407-16

Composition of several fats and oils in total lipids and fatty acid classes (g/100 g)

Food	Total Lipids	Saturated fatty acids	Monounsaturated fatty acids	Polyunsaturated fatty acids
Butter	82	54	21	3
Margarine	82	27	37	14
Olive oil	100	14	73	12
Corn oil	100	17	25	56
Sunflower oil	100	12	20	63

Chemical formulas of representative compounds for each group of minor olive oil components



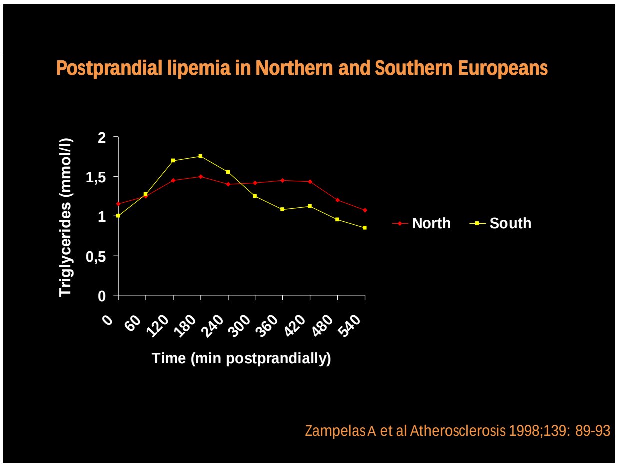
Lou-Bonafonte JM et al Mol Nutr Food Res 2012;56:1043–57

Composition of various oils

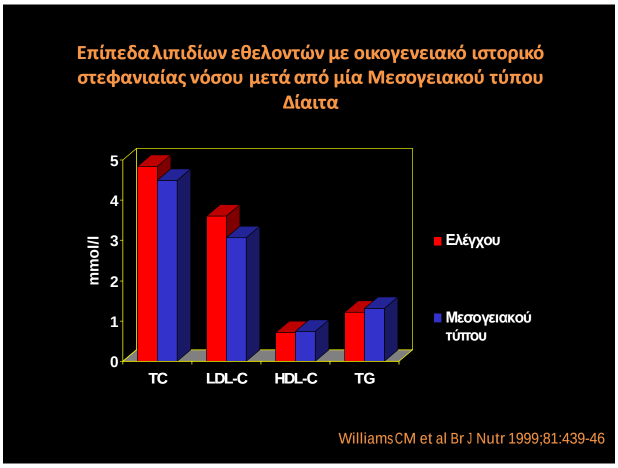
Content	Olive oil	Sunflower-seed oil	Fish oil	Palm oil	Red palm oil
Total SFA (%)	10·9	-	2·6	51	51
Total MUFA (%)	79·8	-	9·4	44·3	38
Total PUFA (%)	9·3	60–75	81·8	3·7	11
Stearic acid (%)	3·4	-	1·2	3·84	5
Palmitic acid (%)	10·1	-	0·9	39·15	44
Oleic acid (%)	72–78·9	-	3·8	43·62	38
Linoleic acid (%)	5·7		1·7	11·32	11
EPA (%)	-	60–70	32·2	-	-
DHA (%)	-	-	31·2	-	-
Vitamin E (ppm)	-	-	-	62 mg/kg	559–1000
Carotenoids (ppm)	-	±500	-	1·2 mg/kg	500
Polyphenols (mg/kg)	230–500	-	-	-	-
Squaline (%)	0·7	-	-	Trace	1·1†
Co-enzyme Q10 (mg/l)	-	-	-	0·4*	0·4*

ppm, Parts per million.
** Indicated value is as found in Carotino Premium palm oil (Carotino Sdn Bhd, Johor Bahru, Malaysia).*
† Indicated value is as found in Carotino red palm oil concentrate (Carotino Sdn Bhd, Johor Bahru, Malaysia).

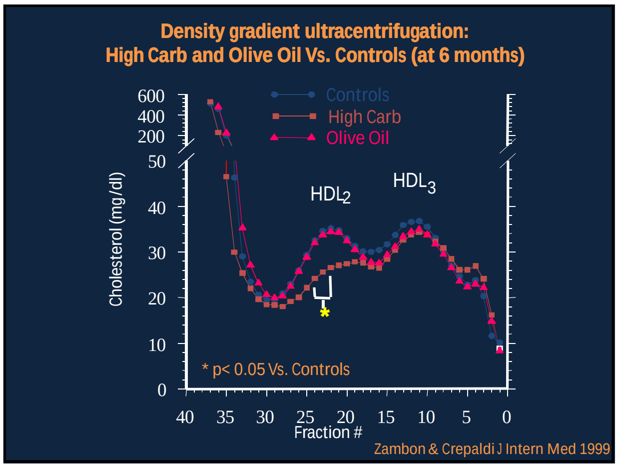
Bester D et al Nutr Res Rev2010;23:334–48



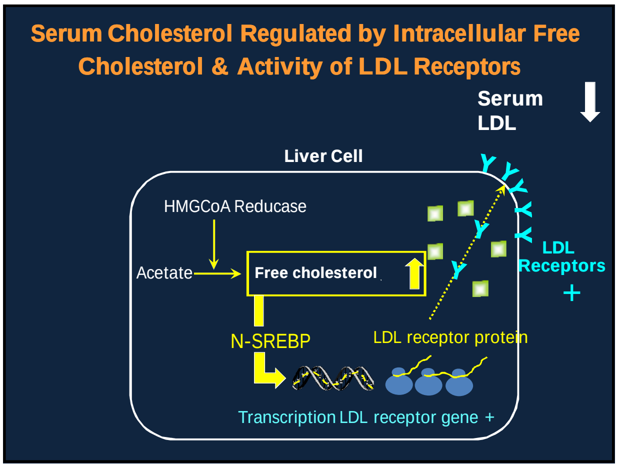
Postprandial lipemia in Northern and Southern Europeans
Triglycerides (mmol/l)
2
1,5
1
0,5
0
0 60 120 180 240 300 360 420 480 540
Time (min postprandially)
North
South
Zampelas A et al Atherosclerosis 1998;139: 89-93



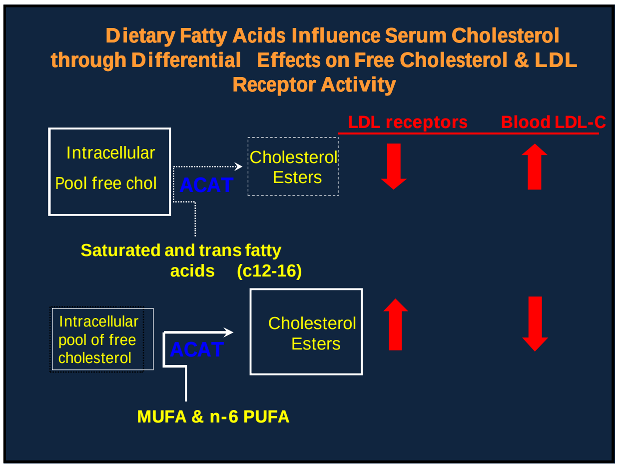
Επίπεδα λιπιδίων εθελοντών με οικογενειακό ιστορικό στεφανιαίας νόσου μετά από μία Μεσογειακού τύπου Δίαιτα
mmol/l
5
4
3
2
1
0
TC
LDL-C
HDL-C
TG
Ελέγχου
Μεσογειακού τύπου
Williams CM et al Br J Nutr 1999;81:439-46

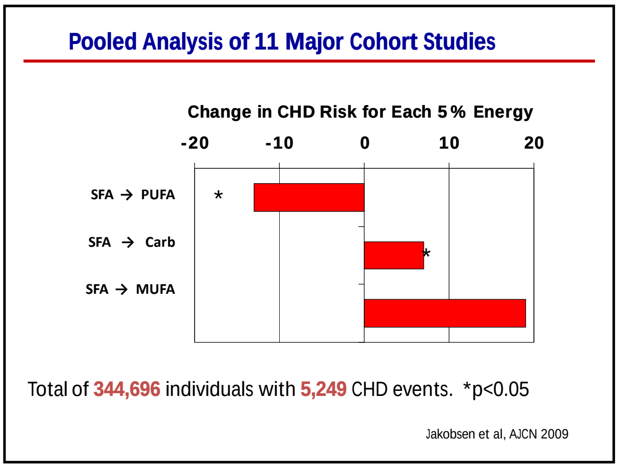


Density gradient ultracentrifugation:
High Carb and Olive Oil Vs. Controls (at 6 months)
Controls
High Carb
Olive Oil
600
400
200
50
40
30
20
10
0
Cholesterol (mg/dl)
HDL2
HDL3
*
* p< 0.05 Vs. Controls
40 35 30 25 20 15 10 5 0
Fraction #
Zambon & Crepaldi J Intern Med 1999



Serum Cholesterol Regulated by Intracellular Free Cholesterol & Activity of LDL Receptors
Serum LDL
Liver Cell
HMGCoA Reducase
Acetate
Free cholesterol
LDL Receptors
+
N-SREBP
LDL receptor protein
Transcription LDL receptor gene +


Dietary Fatty Acids Influence Serum Cholesterol through Differential Effects on Free Cholesterol & LDL Receptor Activity
LDL receptors
Blood LDL-C
Intracellular Pool free chol
ACAT
Cholesterol Esters
Saturated and trans fatty acids (c12-16)
Intracellular pool of free cholesterol
ACAT
Cholesterol Esters
MUFA & n-6 PUFA


Pooled Analysis of 11 Major Cohort Studies
Change in CHD Risk for Each 5% Energy
-20
-10
0
10
20
SFA → PUFA
SFA → Carb
SFA → MUFA
*
*
Total of 344,696 individuals with 5,249 CHD events. *p<0.05
Jakobsen et al, AJCN 2009

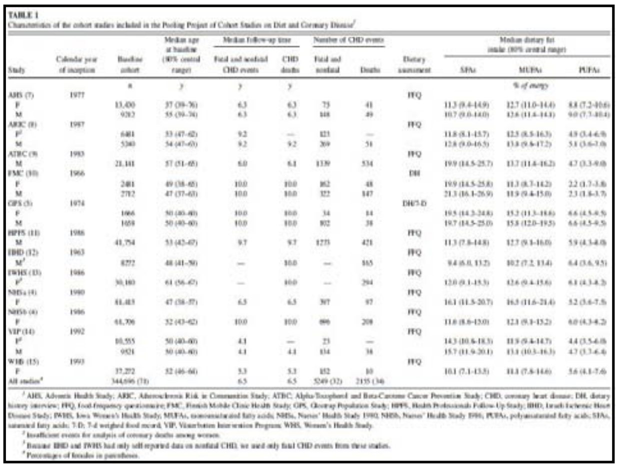
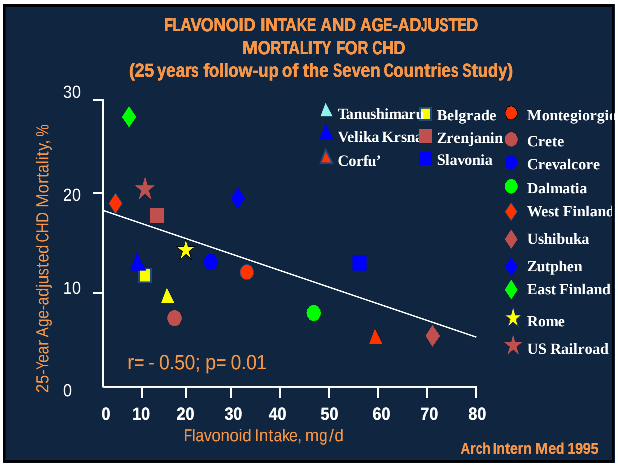
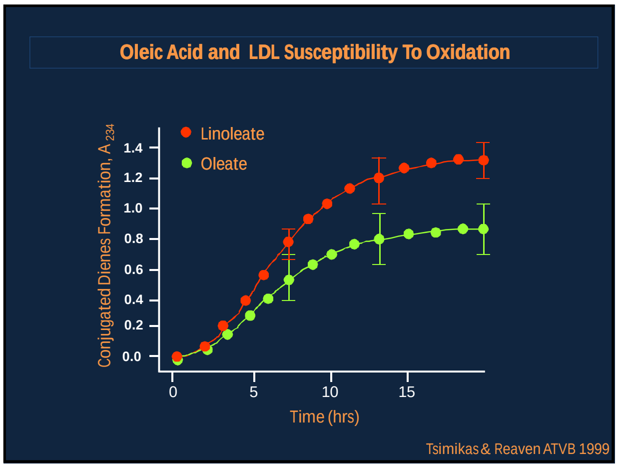
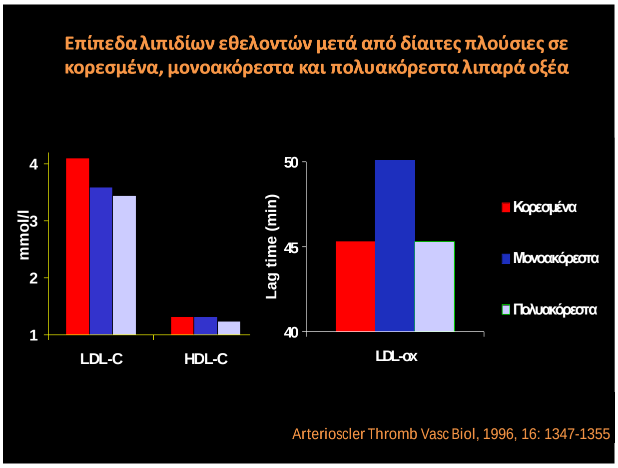


TABLE 1
Characteristics of the cohort studies included in the Pooling Project of Cohort Studies on Diet and Coronary Disease


FLAVONOID INTAKE AND AGE-ADJUSTED MORTALITY FOR CHD
(25 years follow-up of the Seven Countries Study)
25-Year Age-adjusted CHD Mortality, %
0
10
20
30
Flavonoid Intake, mg/d
0
10
20
30
40
50
60
70
80
r= - 0.50; p= 0.01
Tanushimaru
Velika Krsna
Corfu'
Belgrade
Zrenjanin
Slavonia
Montegiorgio
Crete
Crevalcore
Dalmatia
West Finland
Ushibuka
Zutphen
East Finland
Rome
US Railroad
Arch Intern Med 1995


Oleic Acid and LDL Susceptibility To Oxidation
Conjugated Dienes Formation, A_{234}
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Linoleate
Oleate
0
5
10
15
Time (hrs)
Tsimikas & Reaven ATVB 1999


Επίπεδα λιπιδίων εθελοντών μετά από δίαιτες πλούσιες σε κορεσμένα, μονοακόρεστα και πολυακόρεστα λιπαρά οξέα
mmol/l
1
2
3
4
LDL-C
HDL-C
Lag time (min)
40
45
50
LDL-ox
Κορεσμένα
Μονοακόρεστα
Πολυακόρεστα
Arterioscler Thromb Vasc Biol, 1996, 16: 1347-1355

Olive Oil Polyphenols Decrease Blood Pressure and Improve Endothelial Function in Young Women with Mild Hypertension

Rafael Moreno-Luna[1], Rocio Muñoz-Hernandez[1], Maria L. Miranda[1], Alzenira F. Costa[1], Luis Jimenez-Jimenez[2], Antonio J. Vallejo-Vaz[1], Francisco J.G. Muriana[3], Jose Villar[1] and Pablo Stiefel[1]

- A double-blind, randomized, crossover dietary intervention study was conducted.
- After a run-in period of 4 months (baseline values), two diets were used, one with polyphenol-rich olive oil (~30 mg/day), the other with polyphenol-free olive oil.
- Each dietary period lasted 2 months with a 4-week washout between diets.
- Systolic and diastolic BP, serum or plasma biomarkers of endothelial function, oxidative stress, and inflammation, and ischemia-induced hyperemia in the forearm were measured.

Moreno Luna R et al Am J Hypertension 2012; 25:1299-1304

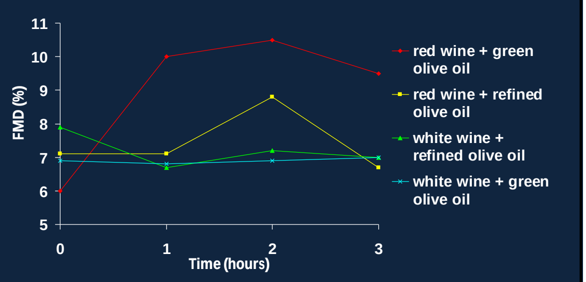
Endothelial function, oxidative stress, and inflammation biomarkers in young women with high-normal BP or stage 1 essential hypertension after 4 months on a Mediterranean-style diet (run-in period) and changes after 2 months on the polyphenolrich or the polyphenol-free olive oil diets

		Changes from baseline		P value*
Biomarker	Baseline	Polyphenol-rich olive oil	Polyphenol-free olive oil	
Nitrites/nitrates (µmol/l)	19.7	+4.7	+0.8	<0.001
ADMA (µmol/l)	0.82	–0.09	–0.04	<0.01
Ox-LDL (µg/l)	153.0	–28.2	–6.9	<0.01
CRP (mg/l)	1.6 ± 0.9	–1.9 ±	–0.6	<0.001
Blood pressure (mm Hg)				
Systolic	134.14	–7.91	–1.65	<0.001
Diastolic	84.64	–6.65	–2.17	<0.001
IRH measurement (PU)				
HA	1,084	+345	+36	<0.001

Table values are mean ± SD, n = 24.
ADMA, asymmetric dimethylarginine; BP, blood pressure; CRP, C-reactive protein; HA, hyperemic area; IRH, ischemia-reactive hyperemia; ox-LDL, oxidized low-density lipoprotein;
PU, perfusion units.
**P value for the comparison across the intervention groups by ANOVA.*

Moreno Luna R et al Am J Hypertension 2012; 25:1299-1304

Postprandial improvement of endothelial function by red wine and olive oil antioxidants: a synergistic effect of components of the Mediterranean diet



Karatzi K, ... & Zampelas A. J Am Coll Nutr 2008;27:448-53

Clinical Research

Antioxidant effect of virgin olive oil in patients with stable coronary heart disease: a randomized, crossover, controlled, clinical trial

M. Fitó[a], M. Cladellas[c,e], R. de la Torre[b,d], J. Martí[c,e], M. Alcántara[a], M. Pujadas-Bastardes[b], J. Marrugat[a,e], J. Bruguera[c], M.C. López-Sabater[f], J. Vila[a], M.I. Covas[a,*]
The members of the SOLOS Investigators[1]

- The aim of this study was to examine the antioxidant and anti-hypertensive effect of two similar olive oils, but with differences in their PC (refined: 14.7 mg/kg versus virgin: 161.0 mg/kg), in 40 males with stable CHD.
- The study was a placebo controlled, crossover, randomized trial.
- A raw daily dose of 50mL of VOO and refined olive oil (ROO) were sequentially administered over two periods of 3 weeks, preceded by 2-week washout periods in which ROO was used.

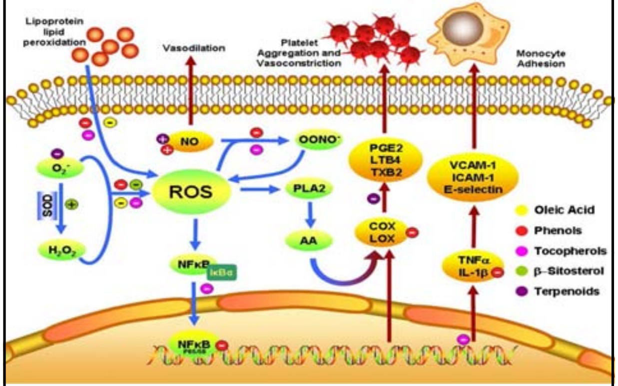
Fito M et al Atherosclerosis 2005;181:149–58

Diastolic and systolic blood pressure, glucose, lipid, and oxidative status markers at baseline and after refined and virgin olive oil administration [mean (S.D.)]

n = 40	Post refined olive oil (14.67 mg/kg)	Post virgin olive oil (161 mg/kg)	Mean difference between interventions (95% confidence interval)	p Intervention (olive oil) effect
Systolic blood pressure (mmHg)	135.2 (6.58)	132.6 (5.6)	−2.53 (−3.78; −1.27)	0.001
Diastolic blood pressure (mmHg)	78.4 (6.0)	79.6 (5.2)	1.16 (−0.06; 2.38)	0.061
Glucose (mmol/L)	6.46 (2.05)	6.65 (2.23)	0.212 (−0.096; 0.519)	0.171
Total cholesterol (mmol/L)	5.02 (0.99)	5.09 (0.85)	0.07 (−0.032; 0.017)	0.176
HDL cholesterol (mmol/L)	1.14 (0.32)	1.12 (0.29)	−0.021 (−0.054; 0.012)	0.207
LDL cholesterol (mmol/L)	3.30 (0.16)	3.33 (0.13)	0.033 (−0.076; 0.142)	0.542
Triglycerides (mmol/L)[a]	1.33 (0.99–1.63)	1.23 (0.88–1.71)	−0.0005 (−0.071; 0.07)	0.990
Lipoprotein (a) (g/L)[a]	0.27 (0.20–0.84)	0.34 (0.18–0.89)	0.017 (−0.008; 0.034)	0.208
Oxidized LDL (μmol/L)	58.66 (23.05)	54.01 (19.89)	−4.66 (−7.08; −2.23)	<0.001
OLAB (U/L)[a]	230 (122–495)	246 (140–487)	9.18 (−27.79; 9.42)	0.323
Lipoperoxides (μmol/L)	1.47 (1.23)	1.23 (0.72)	−0.24 (−0.40; −0.09)	0.003
Glutathione peroxidase (U/L)	7308 (711)	7668 (854)	412 (35.98; 788)	0.033
Total antioxidant status (mmol/L)	0.92 (0.12)	0.91 (0.11)	−0.01 (−0.03; 0.01)	0.301
Tyrosol (μg/L urine)[a]	23.68 (9.38–53.3)	77.5 (74.8–81.0)	32.67 (3.18–62.16)	0.031
Hydroxytyrosol (μg/L urine)[a]	87.2 (74.1–156)	484 (439–531)	374 (310–438)	<0.001
O-methylhydroxytyrosol (μg/L urine)[a]	10.00 (2.93–17.00)	43.18 (31.3–63.9)	33.50 (4.67–62.32)	0.024

Fito M et al Atherosclerosis 2005;181:149–58

Proposed model for the action mechanisms of oleic acid and minor compounds from olive oil



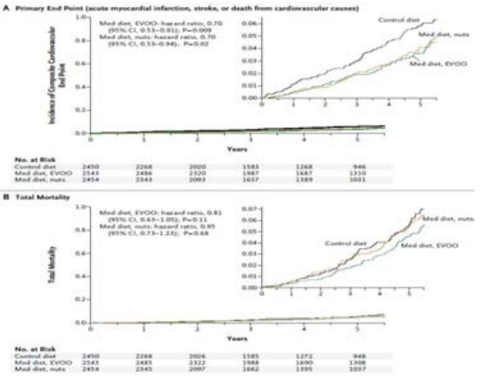
Perona JS et al J Nutr Biochem 2006;17:429–45

Summary of Dietary Recommendations to Participants in the Mediterranean-Diet Groups and the Control-Diet Group

Food	Goal
Mediterranean diet	
Recommended	
Olive oil*	≥4 tbsp/day
Tree nuts and peanuts†	≥3 servings/wk
Fresh fruits	≥3 servings/day
Vegetables	≥2 servings/day
Fish (especially fatty fish), seafood	≥3 servings/wk
Legumes	≥3 servings/wk
Sofrito‡	≥2 servings/wk
White meat	Instead of red meat
Wine with meals (optionally, only for habitual drinkers)	≥7 glasses/wk
Discouraged	
Soda drinks	<1 drink/day
Commercial bakery goods, sweets, and pastries§	<3 servings/wk
Spread fats	<1 serving/day
Red and processed meats	<1 serving/day

Estruch R et al, N Engl J Med 2013;368:1279-90

Primary Prevention of CVD with a Mediterranean Diet: The Predi Med Study



Estruch R et al, N Engl J Med 2013;368:1279-90

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Review

Dietary fats and cardiovascular disease: Putting together the pieces of a complicated puzzle

George Michas [a], Renata Micha [a,b], Antonis Zampelas [a,*]
[a] Unit of Human Nutrition, Department of Food Science and Human Nutrition, Agricultural University of Athens, Iera Odos 75, Athens 11855, Greece
[b] Department of Epidemiology, Harvard School of Public Health, Boston, MA, USA

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Effects of key dietary fats and major food sources on CVD

Dietary factor	Effect[a]	Related CVD outcomes[b]	Source of evidence
Dietary fats			
SFA	Possible	–Incident CHD	Meta-analyses of cohorts [34–36]
PUFA in place of SFA	Probable	↓Incident CHD	Pooled analysis of cohorts [37]; meta-analyses of cohorts and RCTs [38,39]
Industrial trans fats	Convincing	↑Incident CHD	Meta-analyses of cohorts [34,35,46,51]; meta-analysis of RCTs [39]
Ruminant trans fats	Possible	–Incident CHD	Meta-analysis of cohorts [51]
Seafood omega-3 fats	Probable	↓Incident CVD	Meta-analyses of RCTs [59,60]
	Possible	↓Prevalent CVD	Meta-analyses of RCTs [61,62]
Plant omega-3 fats	Possible	↓Incident CHD	Meta-analysis of cohorts [75]
MUFA in place of SFA	Possible	↓Incident CHD	Meta-analyses of cohorts and RCTs [35,37,39]
Major food sources			
Unprocessed red meats	Probable	–Incident CHD	Pooled analysis of cohorts [95]; meta-analysis of cohorts [92]
	Probable	↑Incident stroke	Meta-analyses of cohorts [96,97]
Processed meats	Probable	↑Incident CHD	Meta-analysis of cohorts [92] and 3 cohorts [93,94]
	Probable	↑Incident stroke	Meta-analyses of cohorts [96,97]
Dairy	Possible	↓Incident CVD	Meta-analyses of cohorts [101,102]
Egg	Probable	–Incident CVD	Meta-analyses of cohorts [111,112]
Olive oil	Probable	↓Incident CVD	1 RCT [119] and 3 cohorts [115–117]
Nuts/seeds	Probable	↓Incident CHD	Meta-analysis of 1 RCT and 3 cohorts [127]
	Probable	↓Incident stroke	Meta-analysis of 1 RCT and 3 cohorts [127]

MUFA, monounsaturated fats; PUFA, polyunsaturated fats; SFA, saturated fats.

[a] We reviewed the evidence for convincing, probable, possible, or insufficient effects of key dietary fats and major food sources on cardiovascular disease (CVD), based on multiple criteria for assessing causality of diet-disease relationships [128–130]. We required evidence for effects on clinical events (e.g., coronary heart disease-CHD), rather than simply physiologic risk factors (e.g., blood cholesterol). Best available evidence for each diet-disease relationship were obtained from high-quality published meta-analyses of prospective cohorts or randomized trials (RCTs), as well as individual RCTs or prospective cohorts. We evaluated the meta-analyses on the design and number of studies, sample size and number of events, length of follow-up, statistical method used, degree of heterogeneity, adjustment for confounders, and other potential biases.

[b] Direction of effect: ↓decrease in risk; ↑increase in risk; – no effect.

Michas G, Micha R & Zampelas A Atherosclerosis 2014;234:320-8

Σας ευχαριστώ πολύ για την προσοχή σας