



November 16-18, 2015
Hyatt Boston Harbor

MedDiet: Gold Standard

Nov 17, 2015

Miguel A. Martinez-Gonzalez,
MD, PhD, MPH

Professor and Chair of Preventive
Medicine, University of Navarra, Spain

www.unav.es/preventiva

[**www.predimed.es**](http://www.predimed.es)

www.predimedplus.com

www.ciberobn.es



Outline

**PREDIMED
RCT**

CV+

**Breast &
Brain**

**Nutritional
Adequacy**

**Anti-
Inflammation**

**Other
mechanisms**

Outline

**PREDIMED
RCT**

CV+

**Breast &
Brain**

**Nutritional
Adequacy**

**Anti-
Inflammation**

**Other
mechanisms**

RCTs with hard clinical endpoints

Prospective cohort studies

Nested case-control/case cohort studies

RCTs with intermediate outcomes

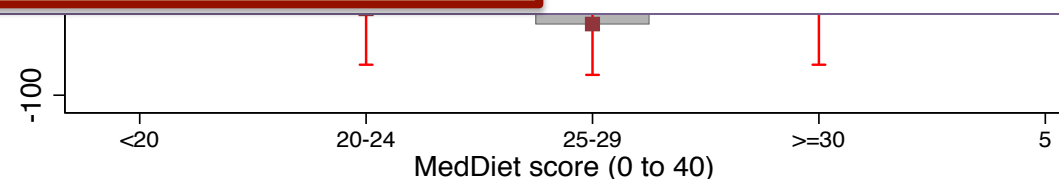
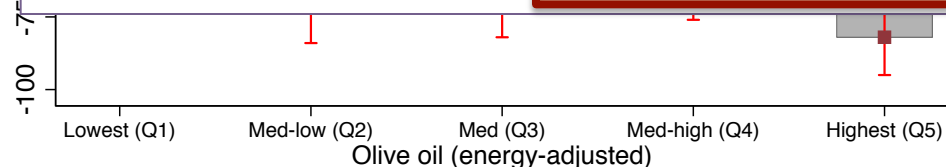
Retrospective case-control studies

Ecological studies

Migrant studies

Cross-sectional studies

FIGURE 1 Hierarchy of study designs in nutritional epidemiology. RCT, randomized controlled trial.



Miguel A. Martínez-González
Elena Fernández-Jarne
Manuel Serrano-Martínez
Amelia Martí
J. Alfredo Martínez
José M. Martín-Moreno

Mediterranean diet and reduction in the risk of a first acute myocardial infarction: an operational healthy dietary score

RCT: Effects of a Mediterranean-type diet on the Primary Prevention of Cardiovascular Disease (*PREDIMED Study*)

www.predimed.es

Predimed
Prevención con Dieta Mediterránea



PREDIMED RCT Design. Participants

- ❑ Men: 55-80 y
- ❑ Women: 60-80 y
- ❑ High risk without CVD
with type 2 diabetes or
3+ CVD risk factors

1. Smoking
2. Hypertension
3. ↑ LDL-C
4. ↓ HDL-C
5. Overweight / obesity
6. Family history of early-onset CHD

Random



**Mediet +
Virgin Olive Oil**



**Mediet +
Nuts**



**Control
Low-fat**

Predimed

Prevención con Dieta Mediterránea

ISC
**Instituto
de Salud
Carlos III**

1. Clinic (Barcelona)- Ramón Estruch



Clinic Lipids- Emilio Ros



2. URV (Reus)- Jordi Salas



3. IMIM (Barcelona)- Montse Fitó



4. U. Valencia- Dolores Corella



5. Hosp. Univ. Álava (Vitoria)- Fernando Arós



6. U. Málaga- Enrique Gómez-Gracia



7. CS S. Pablo (Sevilla)- José Lapetra



8. Son Espases (Mallorca)- Miquel Fiol / D. Romaguera



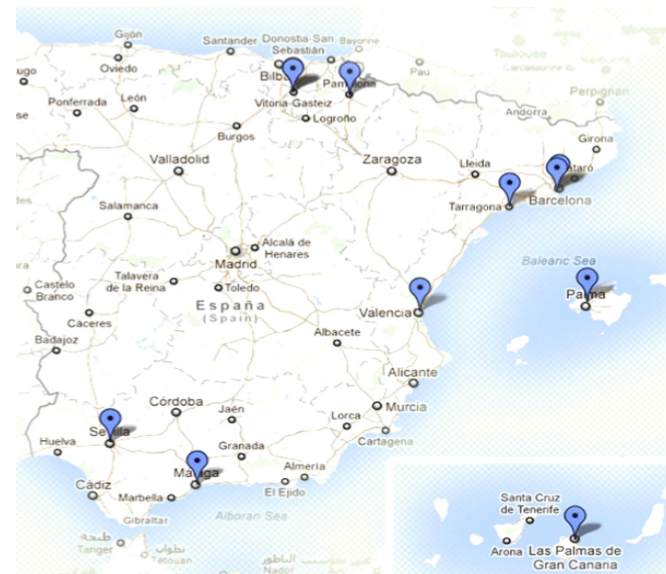
9. U. Las Palmas- Lluís Serra-Majem



10. H. Belvitge (Barcelona)- Xavier Pintó



11. U. Navarra / Osasunbidea – Miguel A. Martínez-González



ciberobn

Centro de Investigación Biomédica en Red
Fisiopatología de la Obesidad y Nutrición

www.predimed.es

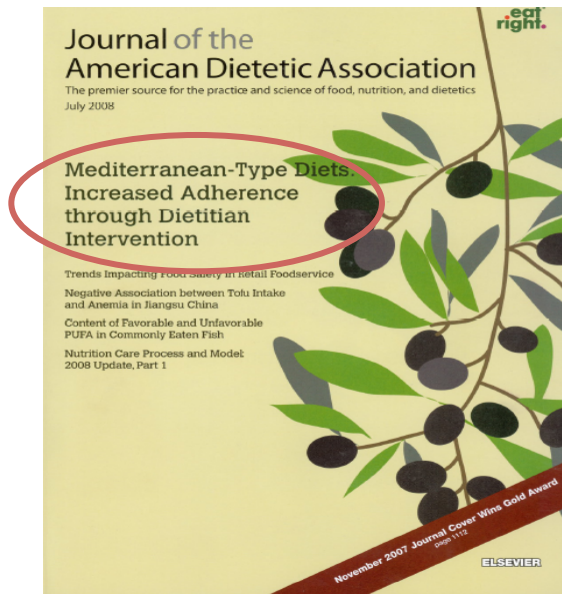
G 03/140: 2003-2005 (Clinic)
RD 06/0045: 2006-2013 (Univ. Navarra)
CIBERobn: 2013-

n = 7,447

	Mediet + VOO (n= 2543)	MeDiet + Nuts (n=2454)	Control (n=2450)
Age (SD)	67 (6)	67 (6)	67 (6)
Women (%)	59	54	60
Diabetes (%)	50	47	48
Hypertension (%)	82	82	84
Current smokers (%)	14	15	14
High cholest. (%)	72	73	72
BMI (SD)	30 (4)	30 (4)	30 (4)
Waist (SD)	100 (10)	100 (11)	101 (11)

14-point score

1. Olive oil main culinary fat
2. Olive oil ≥ 4 tablespoons/d
3. Veggies ≥ 2 serv./d
4. Fruits ≥ 3 serv./d
5. Red meats < 1 /d
6. Butter, marg, cream < 1 /d
7. Soda drinks < 1 /d
8. Wine ≥ 7 glasses/wk
9. Legumes ≥ 3 /wk
10. Fish & seafood ≥ 3 /wk
11. Cakes, sweets < 3 /wk
12. Nuts ≥ 3 /wk
13. Poultry $>$ red meats
14. Sofrito



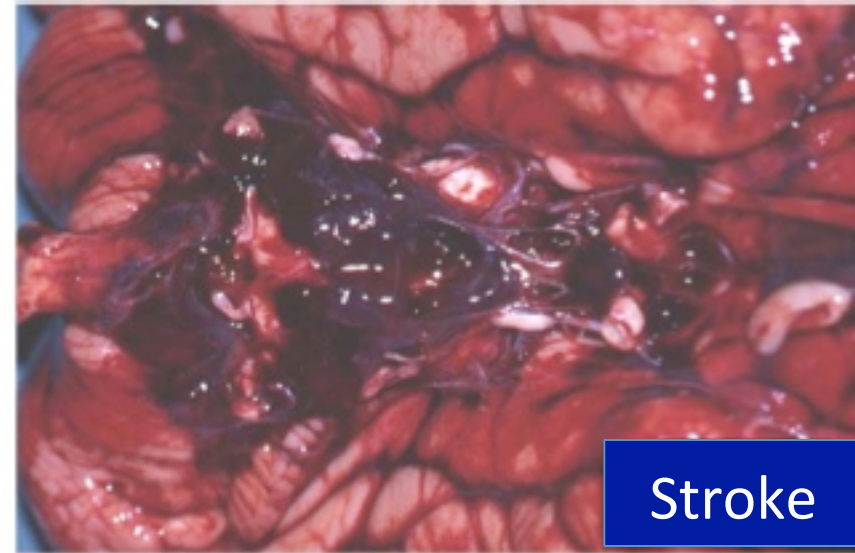
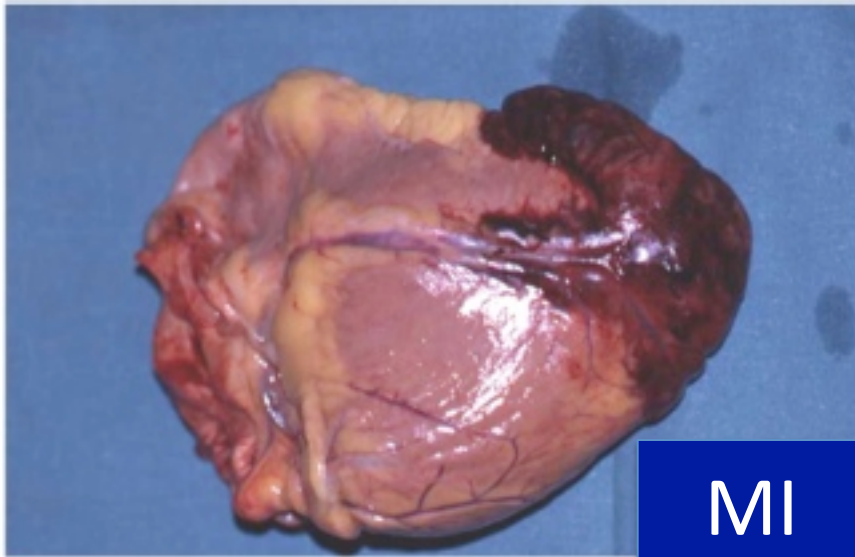
Zazpe et al for the PREDIMED group,
J Am Diet Assoc 2008;108:1134-44



Sesión grupal PREDIMED.

Mediterranean diet			Low-fat diet (control)		N Engl J Med 2013;368:1279-90
Recommended			Recommended		
Olive oil*	≥4 tbsp/day		Low-fat dairy products	≥3 servings/day	
Tree nuts and peanuts†	≥3 servings/wk		Bread, potatoes, pasta, rice	≥3 servings/day	
Fresh fruits	≥3 servings/day		Fresh fruits	≥3 servings/day	
Vegetables	≥2 servings/day		Vegetables	≥2 servings/day	
Fish (especially fatty fish), seafood	≥3 servings/wk		Lean fish and seafood	≥3 servings/wk	
Legumes	≥3 servings/wk		Discouraged		
Sofrito‡	≥2 servings/wk		Vegetable oils (including olive oil)	≤2 tbsp/day	
White meat	Instead of red meat		Commercial bakery goods, sweets, and pastries§	≤1 serving/wk	
Wine with meals (optionally, only for habitual drinkers)	≥7 glasses/wk		Nuts and fried snacks	≤1 serving /wk	
Discouraged			Red and processed fatty meats	≤1 serving/wk	
Soda drinks	<1 drink/day		Visible fat in meats and soups¶	Always remove	
Commercial bakery goods, sweets, and pastries§	<3 servings/wk		Fatty fish, seafood canned in oil	≤1 serving/wk	
Spread fats	<1 serving/day		Spread fats	≤1 serving/wk	
Red and processed meats	<1 serving/day		Sofrito‡	≤2 servings/wk	

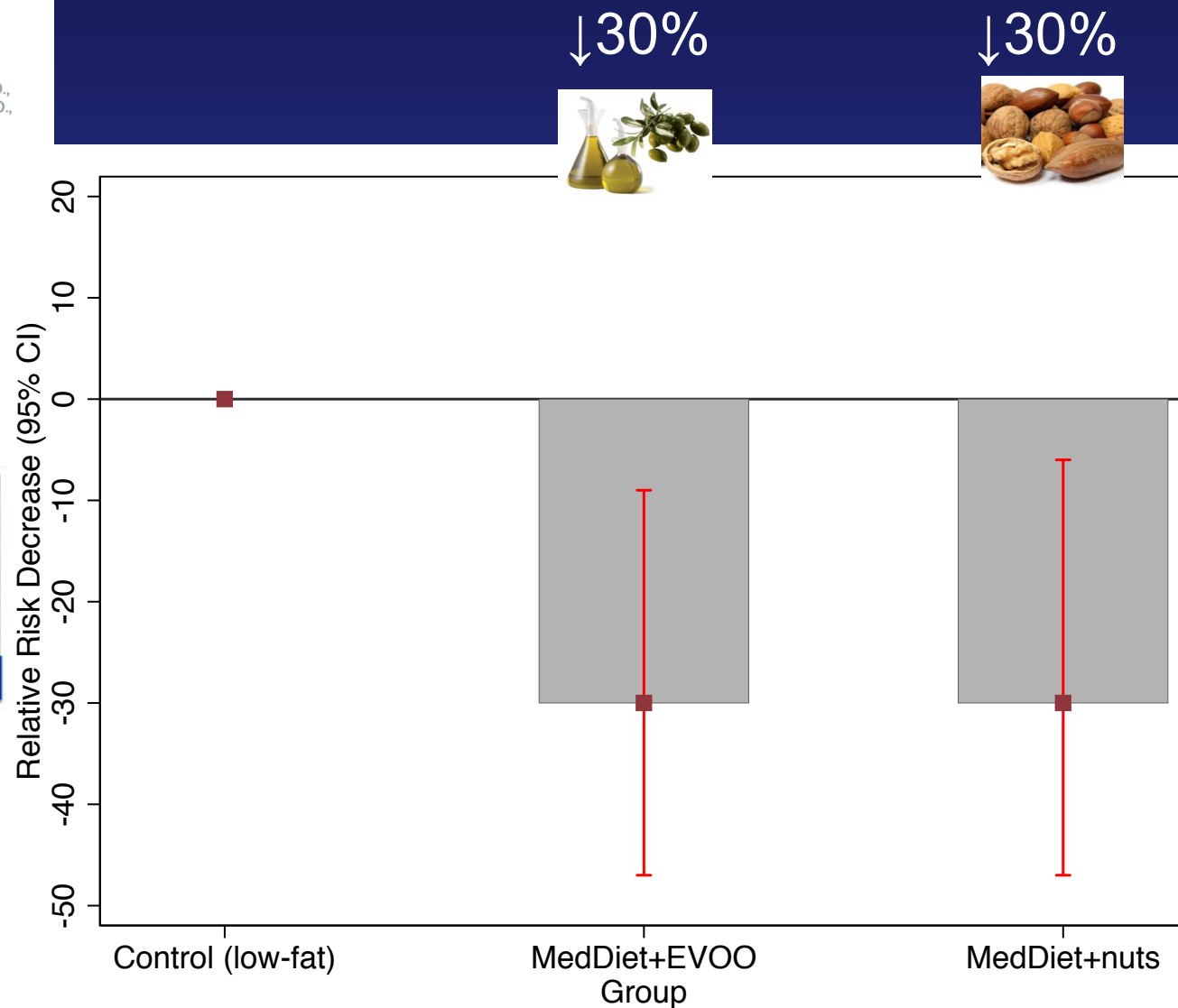
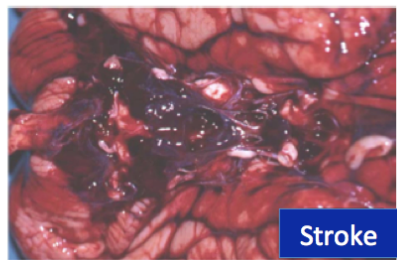
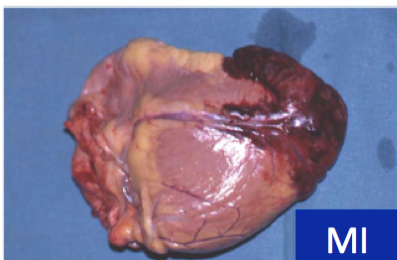
Myocardial Infarction– Heart Attack
Cerebrovascular disease– Stroke
Cardiovascular deaths



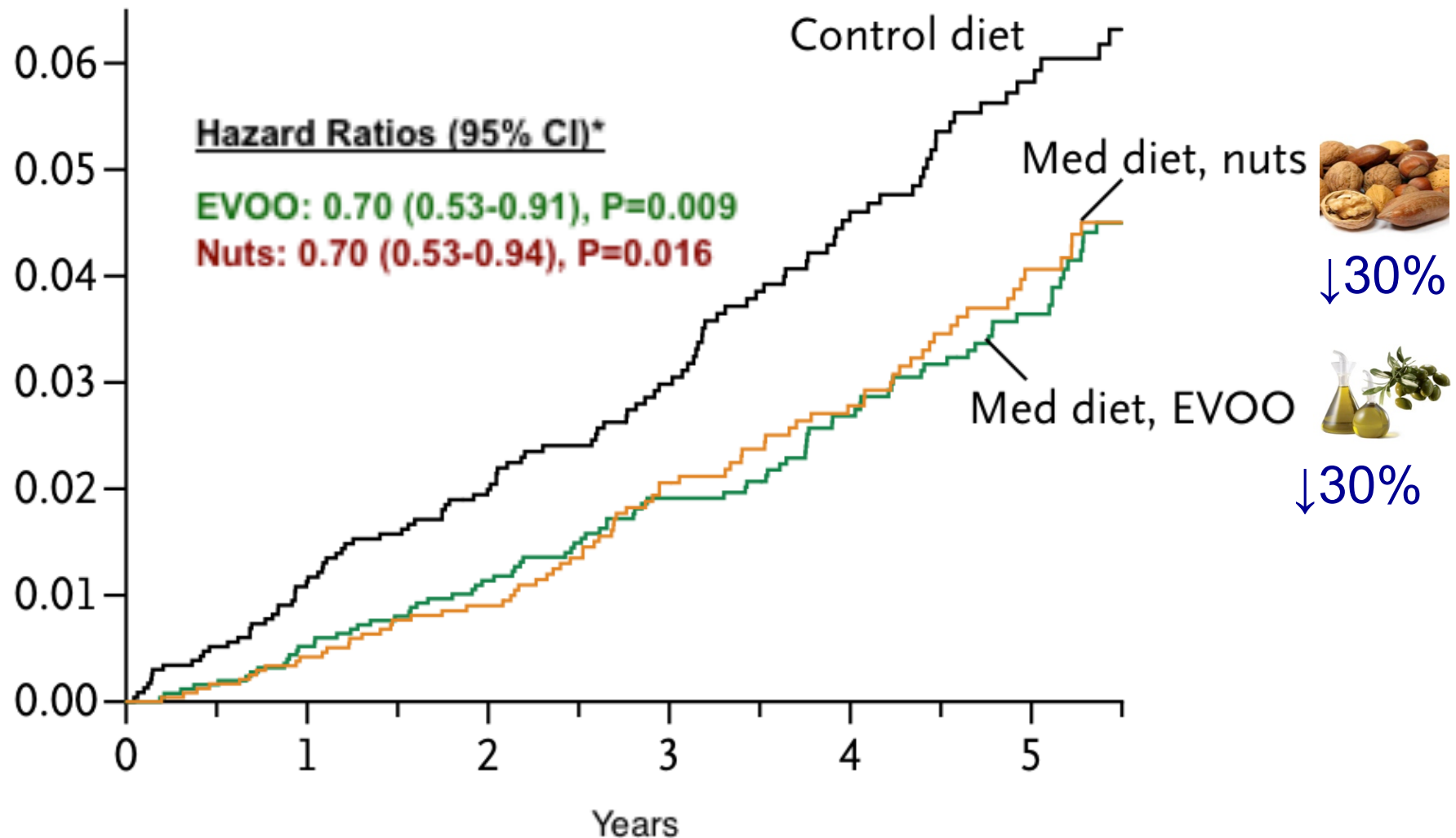
Primary Prevention of Cardiovascular Disease with a Mediterranean Diet

Ramón Estruch, M.D., Ph.D., Emilio Ros, M.D., Ph.D., Jordi Salas-Salvadó, M.D., Ph.D., Maria-Isabel Covas, D.Pharm., Ph.D., Dolores Corella, D.Pharm., Ph.D., Fernando Arós, M.D., Ph.D., Enrique Gómez-Gracia, M.D., Ph.D., Valentina Ruiz-Gutiérrez, Ph.D., Miquel Fiol, M.D., Ph.D., José Lapetra, M.D., Ph.D., Rosa Maria Lamuela-Raventós, D.Pharm., Ph.D., Lluís Serra-Majem, M.D., Ph.D., Xavier Pintó, M.D., Ph.D., Josep Basora, M.D., Ph.D., Miguel Angel Muñoz, M.D., Ph.D., José V. Sorlí, M.D., Ph.D., José Alfredo Martínez, D.Pharm, M.D., Ph.D., and Miguel Angel Martínez-González, M.D., Ph.D., for the PREDIMED Study Investigators*

Myocardial Infarction— Heart Attack
Cerebrovascular disease— Stroke
Cardiovascular deaths



PREDIMED RCT– Primary end-point (MI, stroke or CV death)



Number at risk

Control group	2450	2268	2020	1583	1268	946
MeDiet+EVOO	2543	2486	2320	1987	1687	1310
MeDiet+Nuts	2454	2343	2093	1657	1389	1031

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

Altmetric 2,518 // Citations: 1,373 (ggogle scholar)
[Up to Nov 14, 2015]

Overview of attention for article published in New England Journal of Medicine, February 2013



About this score

In the top 5% of all research outputs scored by Altmetric

MORE...

Mentioned by

- 69 news outlets
- 54 blogs
- 1 policy source
- 2233 tweeters
- 441 Facebook pages
- 1 Wikipedia page
- 44 Google+ users
- 4 Redditors
- 1 research highlight platform
- 1 video uploader

SUMMARY

News

Blogs

Policy documents

Twitter

Facebook

Wikipedia

Google+

More.

You are seeing a free-to-access but limited selection of the activity Altmetric has collected about this scholarly content. [Click here to find out more.](#)

Title	Primary Prevention of Cardiovascular Disease with a Mediterranean Diet.
Published in	New England Journal of Medicine, February 2013
DOI	10.1056/nejmoa1200303 ↗
Pubmed ID	23432189 ↗
Authors	Ramón Estruch, Emilio Ros, Jordi Salas-Salvadó, María-Isabel Covas, D.Pharm., Dolores Corella, Fernando Arós, Enrique Gómez-Gracia, Valentina Ruiz-Gutiérrez, Miquel Fiol, José Lapetra, Rosa Maria Lamuela-Raventos, Lluís Serra-Majem, Xavier Pintó, Josep Basora, Miguel Angel Muñoz, José V. Sorlí, José Alfredo Martínez, Miguel Angel Martínez-González [hide]
Abstract	Observational cohort studies and a secondary prevention trial have shown an inverse association... [show]

[↗](#) View on publisher site

[✉](#) Alert me about new mentions

TWITTER DEMOGRAPHICS

MENDELEY READERS

SCORE IN CONTEXT



This research output has an **Altmetric score** of **2518**. This is our high-level measure of the quality and quantity of online attention that it has received. This score was calculated when the research output was last mentioned on **31 October 2015**.

ALL RESEARCH OUTPUTS

#27

of 4,501,905 outputs

OUTPUTS FROM NEW ENGLAND JOURNAL OF MEDICINE

#1

of 13,959 outputs

OUTPUTS OF SIMILAR AGE

#1

of 89,339 outputs

OUTPUTS OF SIMILAR AGE FROM NEW ENGLAND JOURNAL OF MEDICINE

#1

of 310 outputs

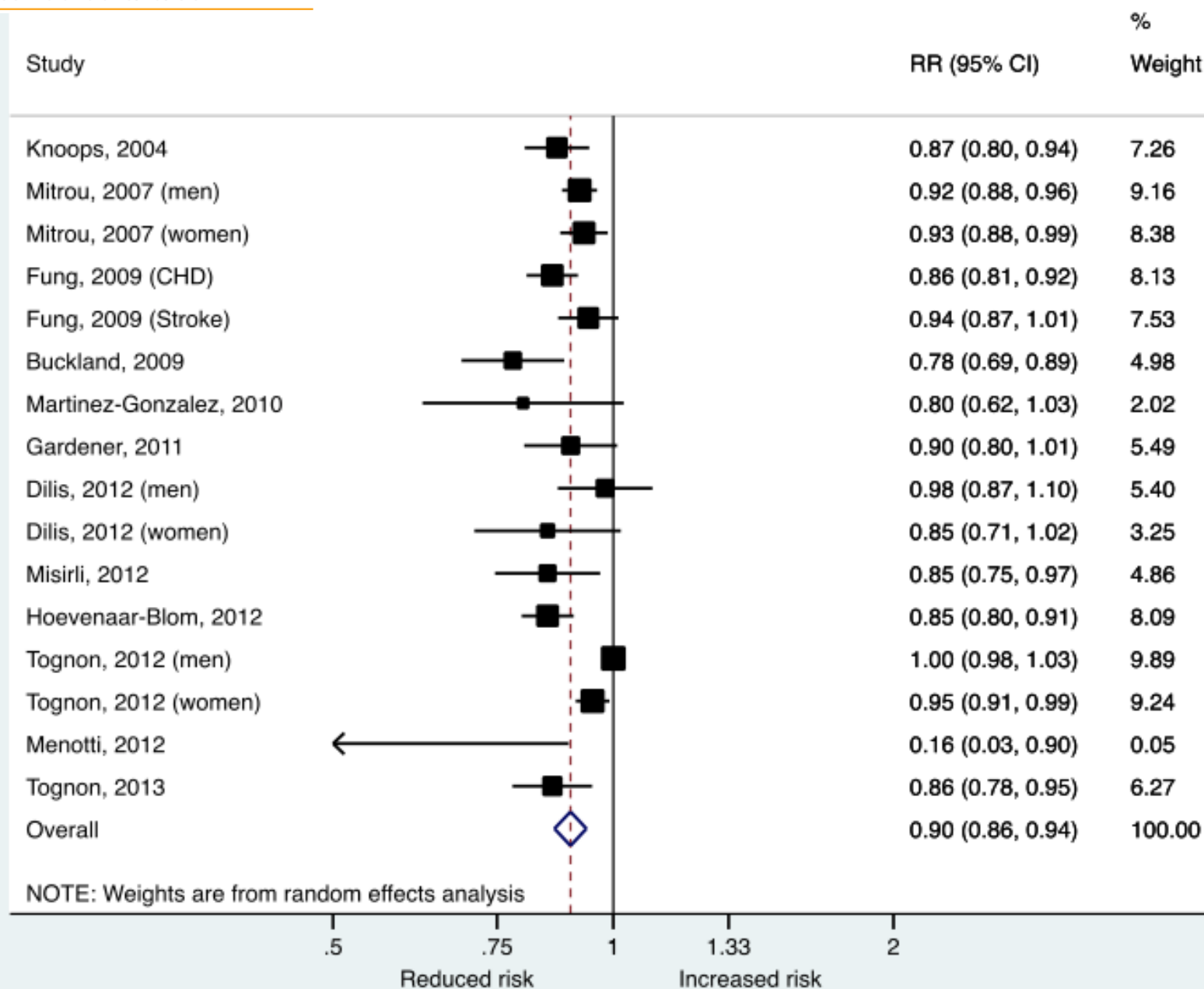
Table 3. Outcomes According to Study Group.*

End Point	Mediterranean Diet with EVOO (N=2543)	Mediterranean Diet with Nuts (N=2454)	Control Diet (N=2450)
Stroke			
No. of events	49	32	58
Crude rate/1000 person-yr (95% CI)	4.1 (3.1–5.5)	3.1 (2.1–4.4)	5.9 (4.5–7.7)
Myocardial infarction			
No. of events	37	31	38
Crude rate/1000 person-yr (95% CI)	3.1 (2.2–4.3)	3.0 (2.0–4.2)	3.9 (2.8–5.3)
Death from cardiovascular causes			
No. of events	26	31	30
Crude rate/1000 person-yr (95% CI)	2.2 (1.4–3.2)	3.0 (2.0–4.2)	3.1 (2.1–4.4)

- Customary in CV trials:
 - a composite 1^{ary} end-point (including the main hard end-points)
- Sharing of similar pathophysiological mechanisms
- Defined in advance in our protocol
- Statistical power needed
- "both rates and risks for *all* competing events remain useful and tend to supplement each other when studying models for competing risks."*
- In this context, the use of a composite outcome including all competing events (that is, MI, stroke and cardiovascular death) seems the most sensible option.

*Andersen PK, Geskus RB, de Witte T, Putter H. Competing risks in epidemiology: possibilities and pitfalls. Int J Epidemiol. 2012;41:861-70.

Miguel Angel Martinez-Gonzalez^{a,b} and Maira Bes-Rastrollo^a



PREDIMED RCT– 2ry outcomes in the total trial

- Peripheral artery disease
- Diabetes
- Atrial fibrillation
- Breast cancer
- Cognition
- Depression
- Body weight (submitted)
- Other major cancers (under scrutiny)
- Heart failure (under scrutiny)

Outline

**PREDIMED
RCT**

CV+

**Breast &
Brain**

**Nutritional
Adequacy**

**Anti-
Inflammation**

**Other
mechanisms**

Outline

**PREDIMED
RCT**

CV+

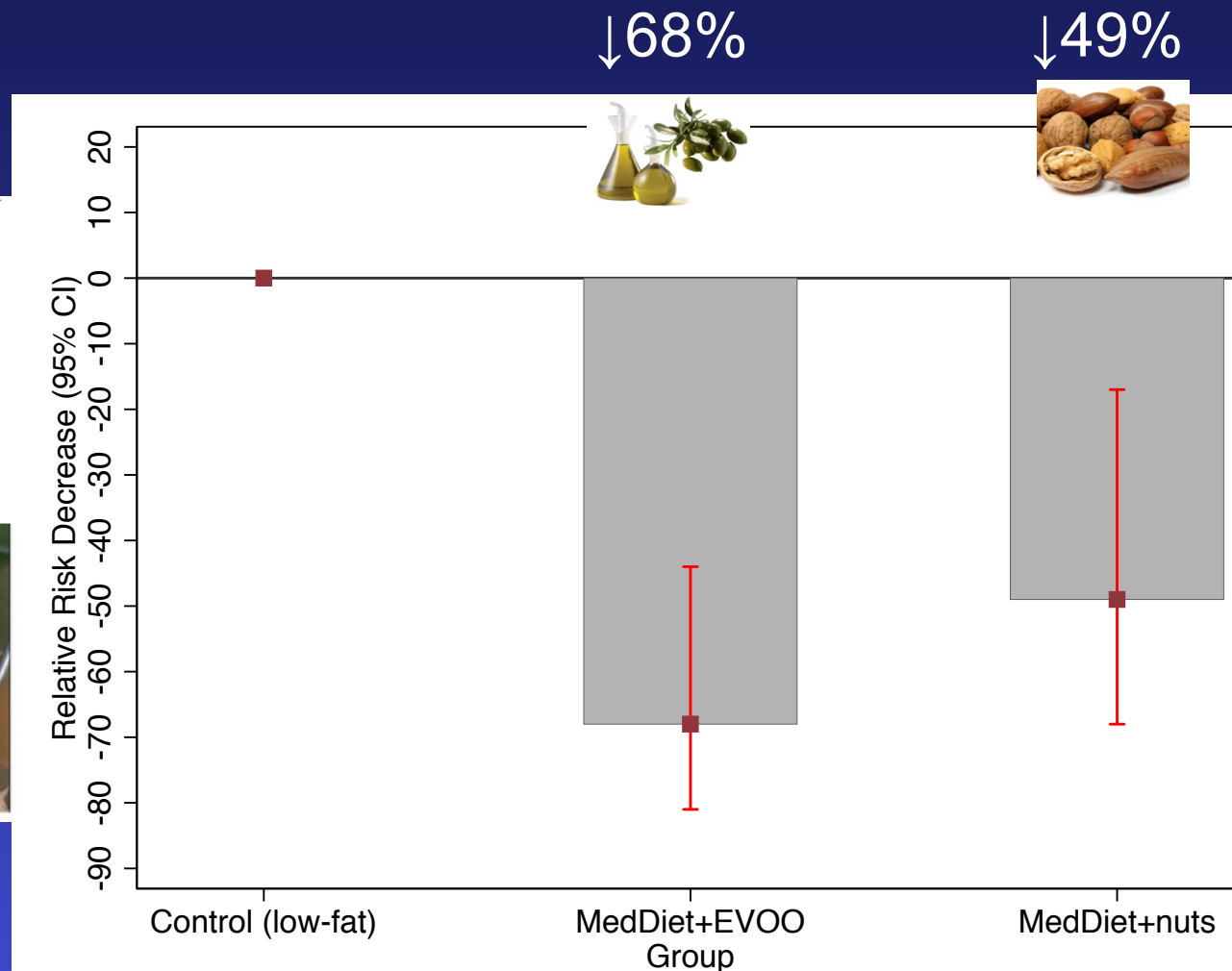
**Breast &
Brain**

**Nutritional
Adequacy**

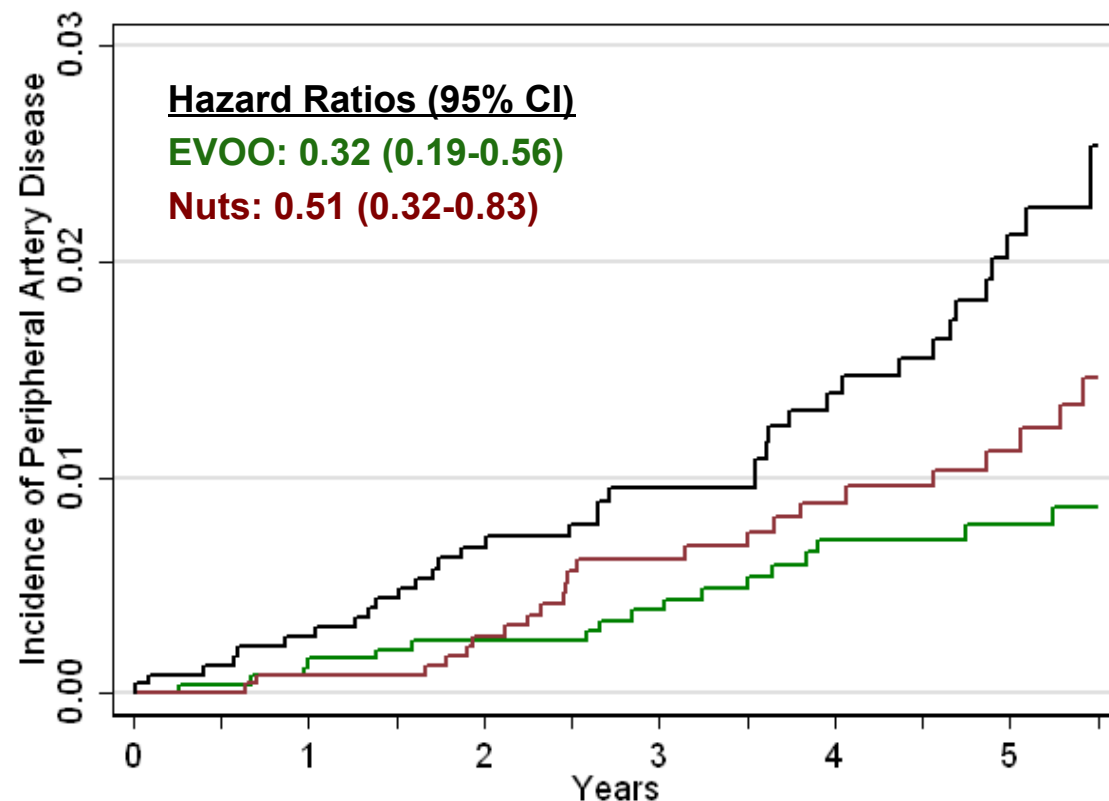
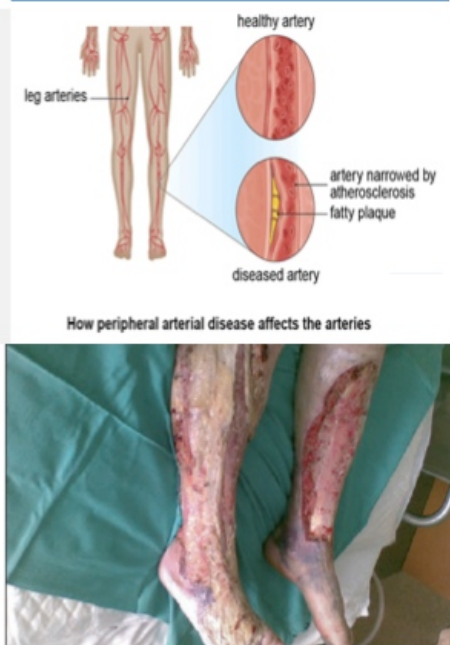
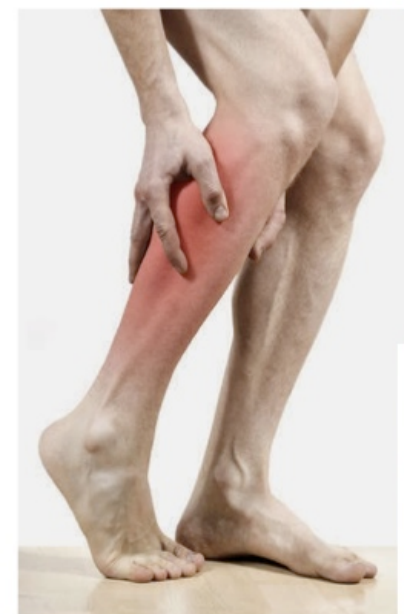
**Anti-
Inflammation**

**Other
mechanisms**

PREDIMED RCT– Peripheral Artery Disease



PREDIMED RCT– Peripheral Artery Disease



Number at risk

MedDiet with VOO	2539	2478	2311	1977	1675	1298
MedDiet with nuts	2452	2342	2092	1649	1382	1023
Control diet	2444	2258	2006	1569	1254	928

N = 89 cases
Follow-up 4.8 y

↓49%

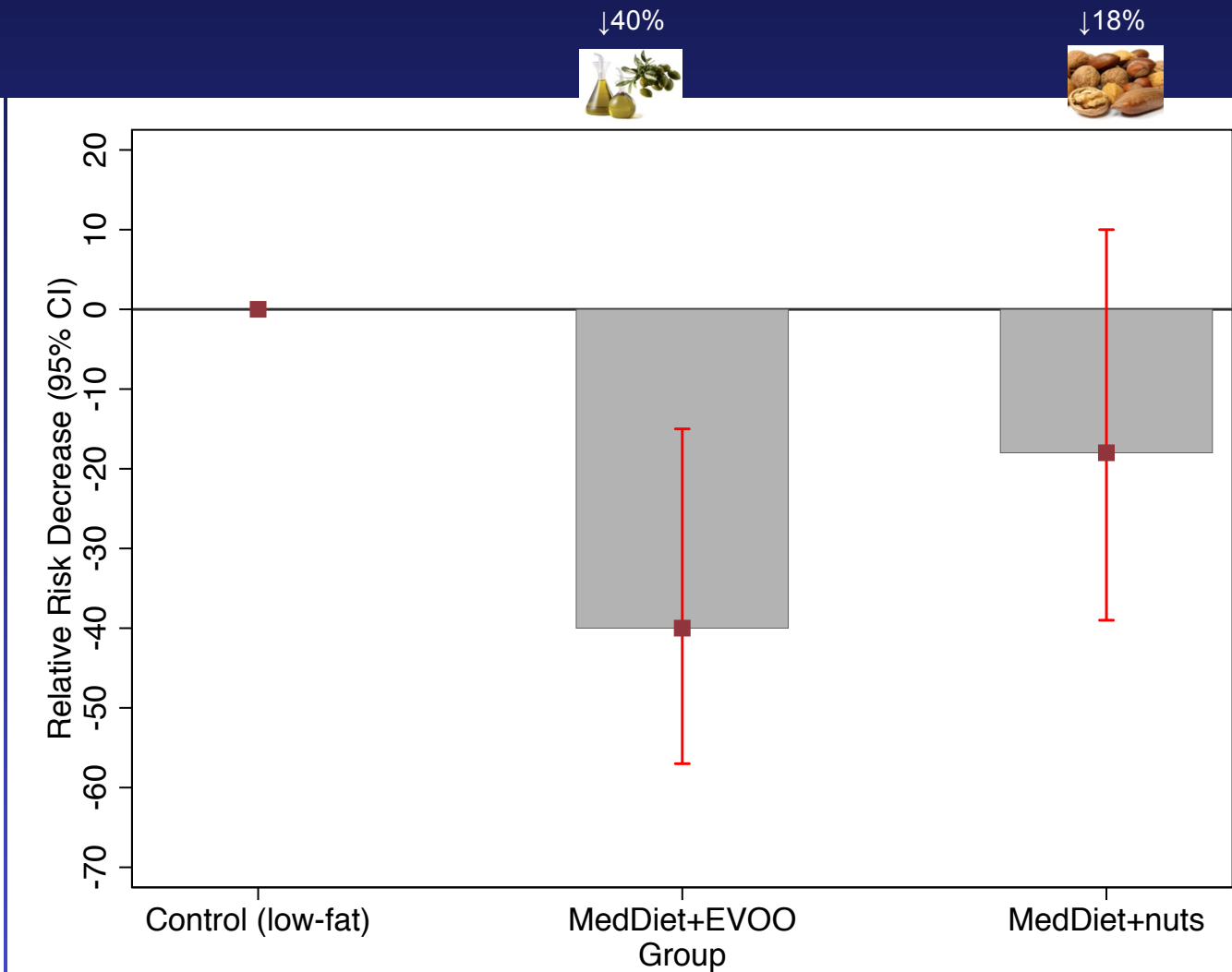
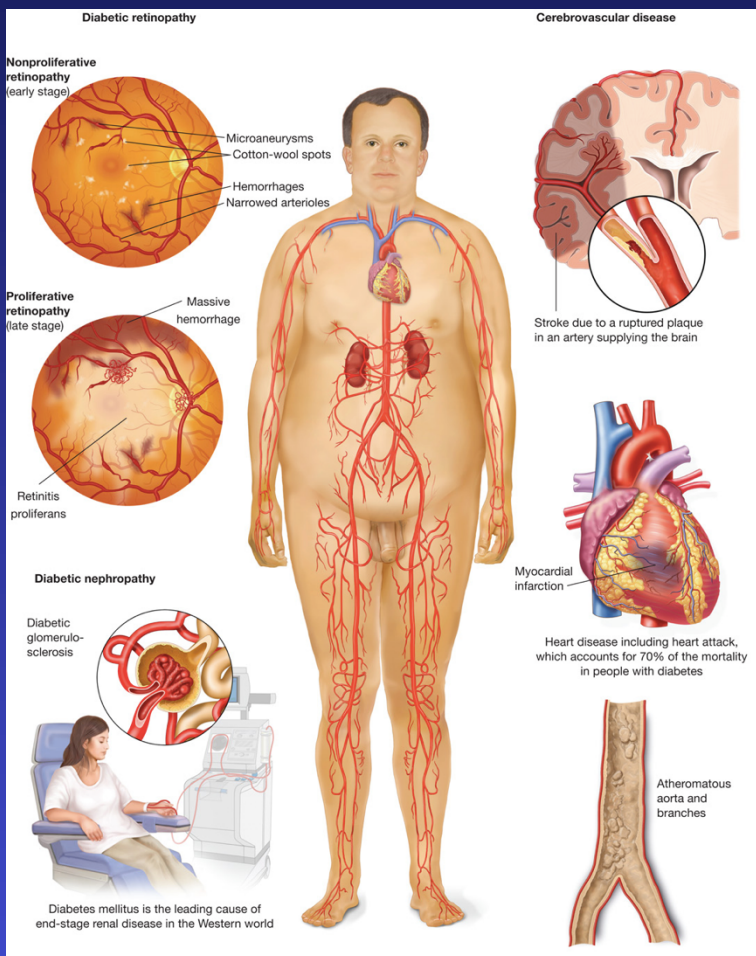


↓68%

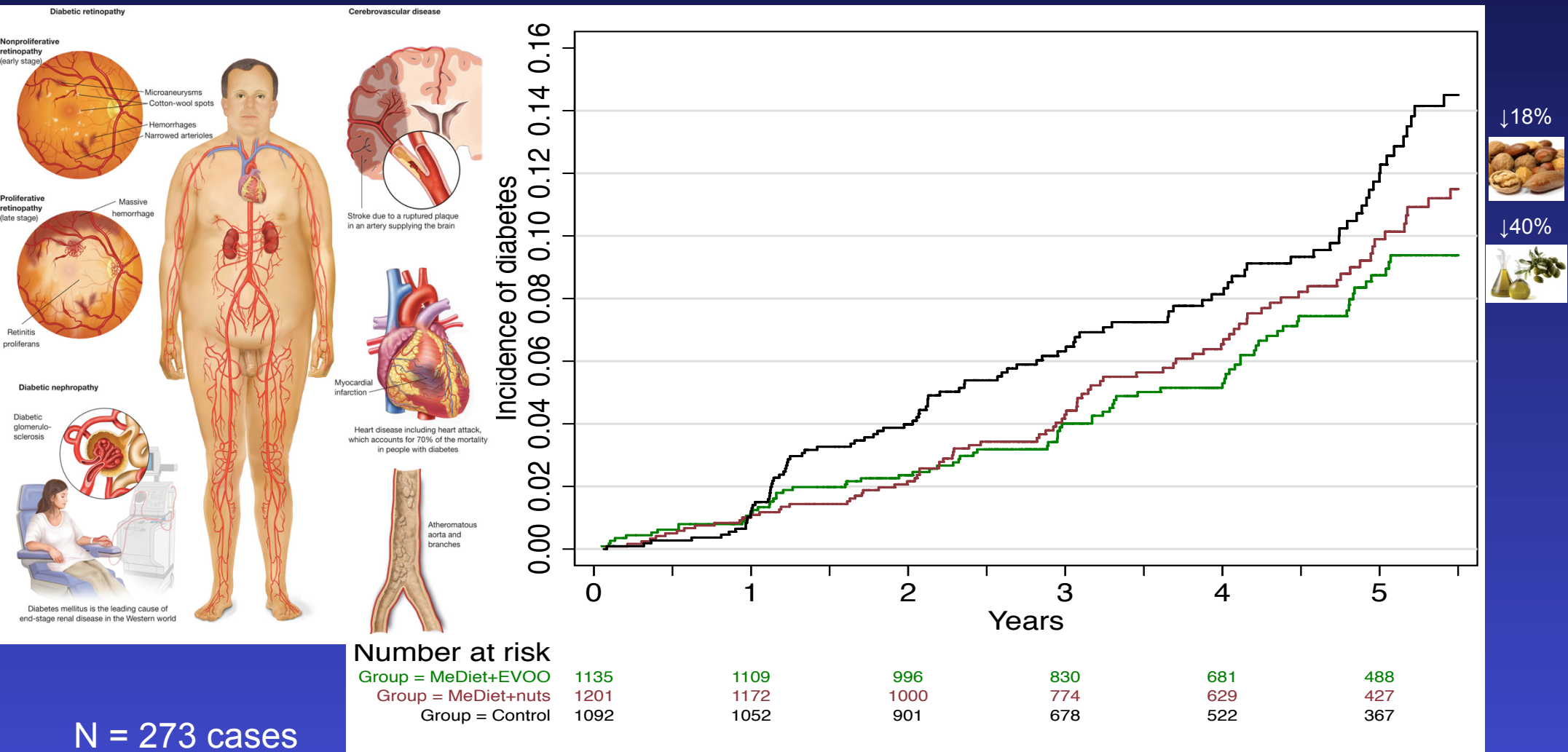
Ruiz-Canela M, et al. JAMA 2014;311:415-7.

PREDIMED RCT - Incident diabetes

Type-2 diabetes



PREDIMED RCT - Incident diabetes



N = 273 cases

Follow-up 4.1 y

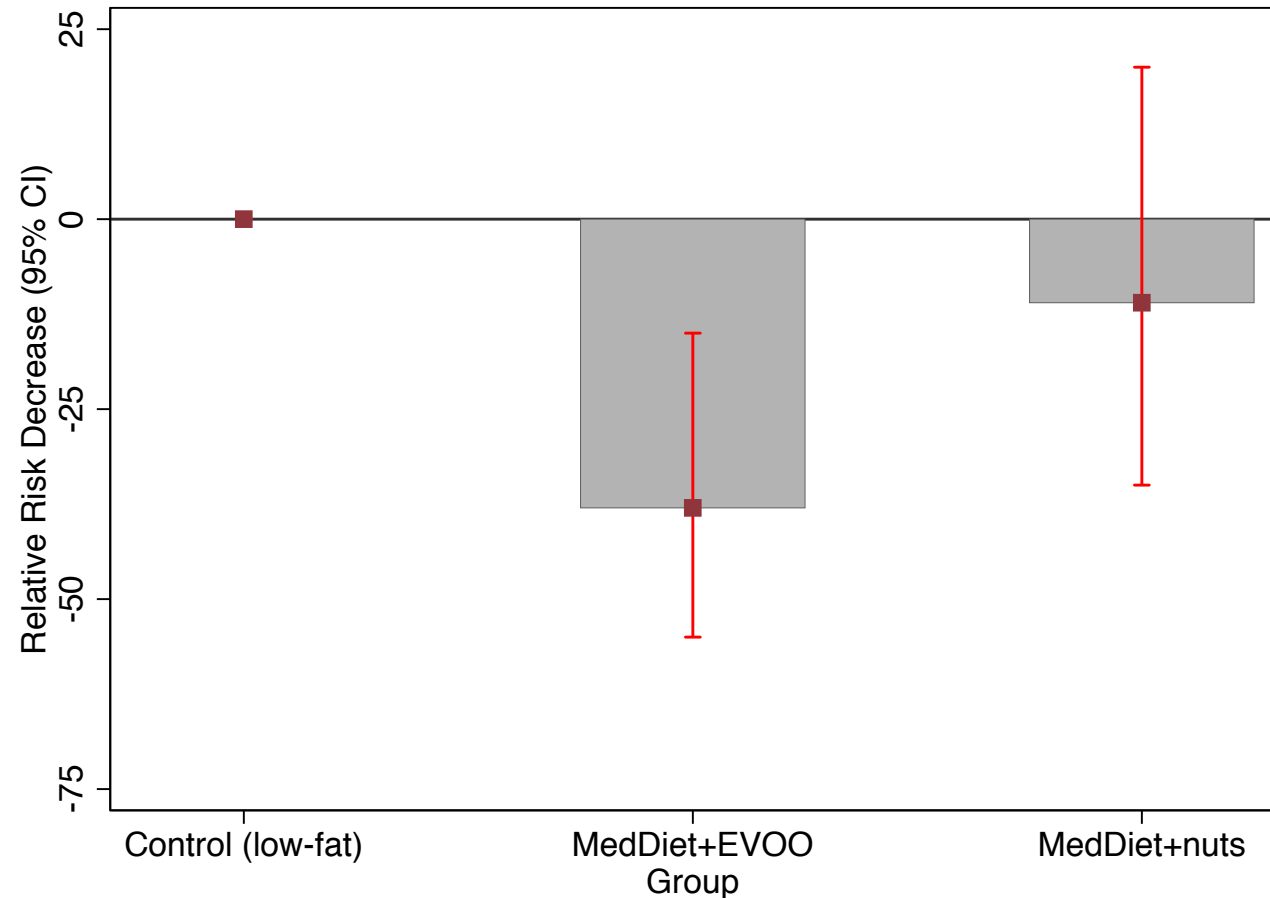
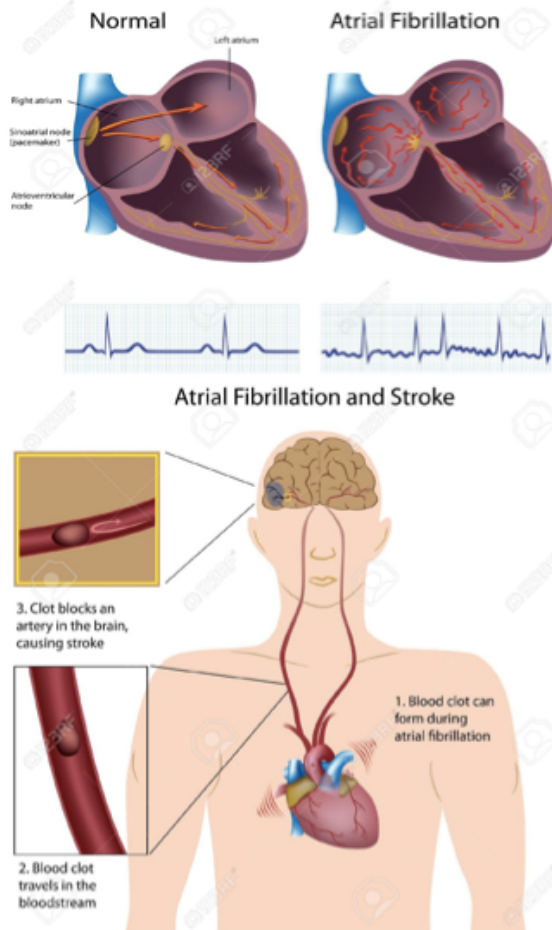
Salas-Salvadó J, et al. Ann Intern Med 2014;160:1-10.

PREDIMED RCT – Atrial Fibrillation

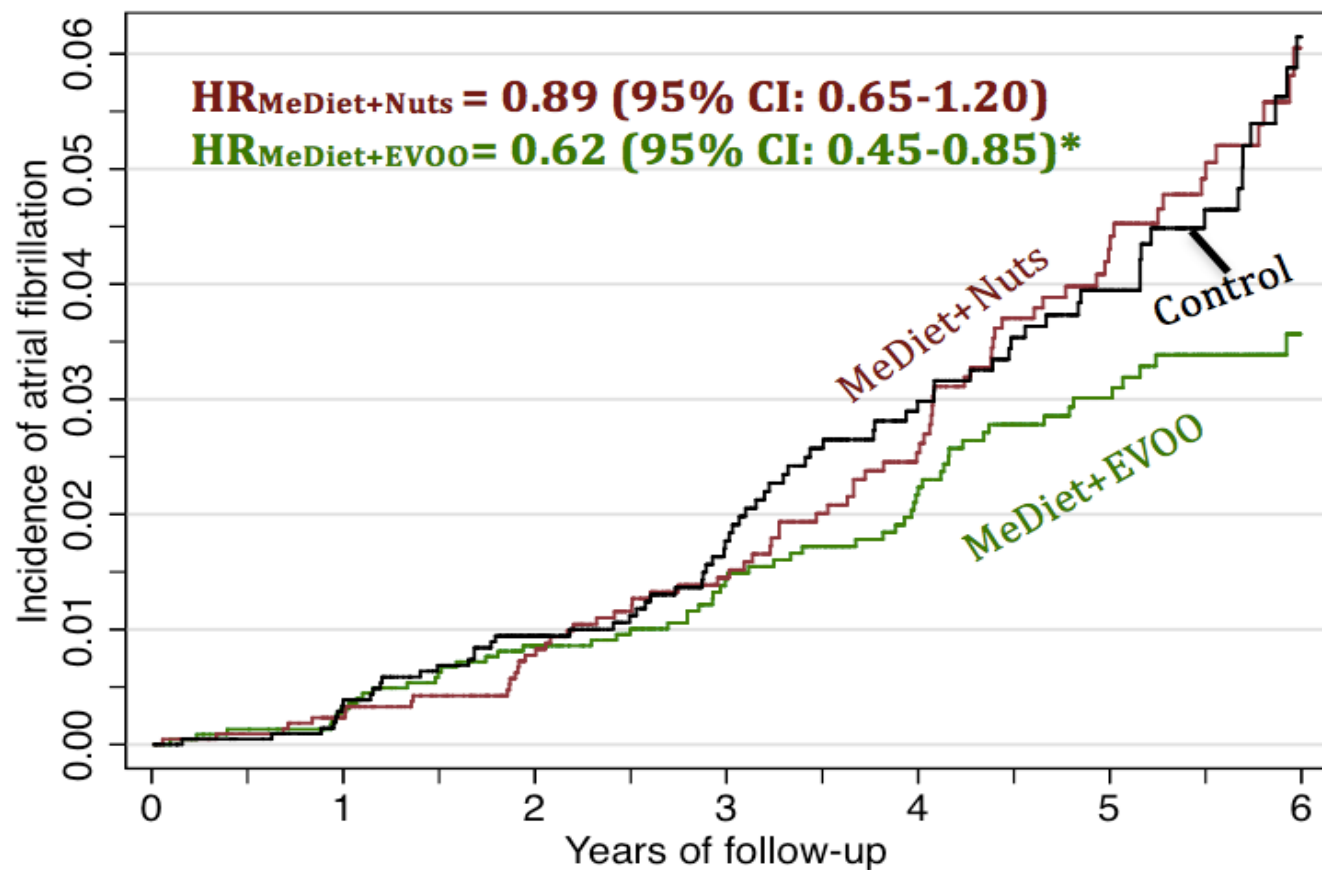
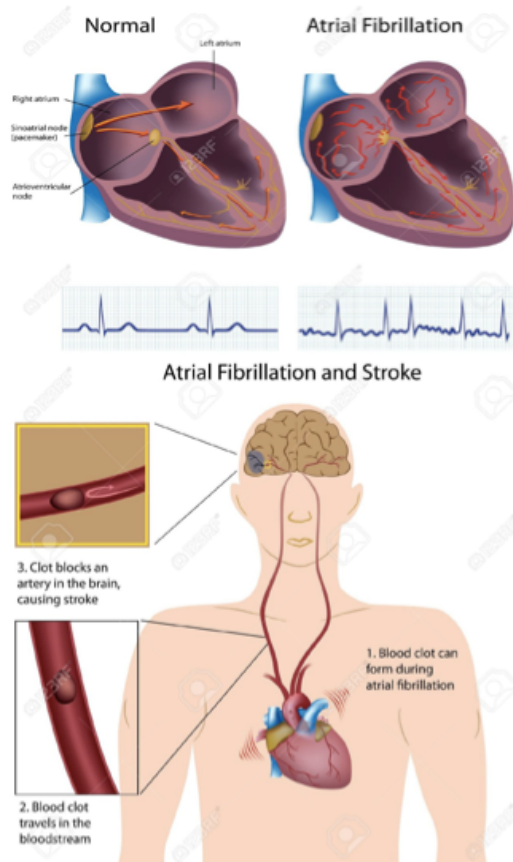
↓38%



↓11%



PREDIMED RCT – Atrial Fibrillation



Number at risk

g = MeDiet+EVOO	2292	2234	2097	1798	1511	1144	496
g = MeDiet+Nuts	2210	2113	1899	1499	1244	903	387
g = Control	2203	2044	1837	1438	1152	851	358

253 cases
Follow-up 4.7 y

↓11%



↓38%

Martínez-González MA, et al. Circulation 2014;130:18-26

Outline

**PREDIMED
RCT**

CV+

**Breast &
Brain**

**Nutritional
Adequacy**

**Anti-
Inflammation**

**Other
mechanisms**

Outline

**PREDIMED
RCT**

CV+

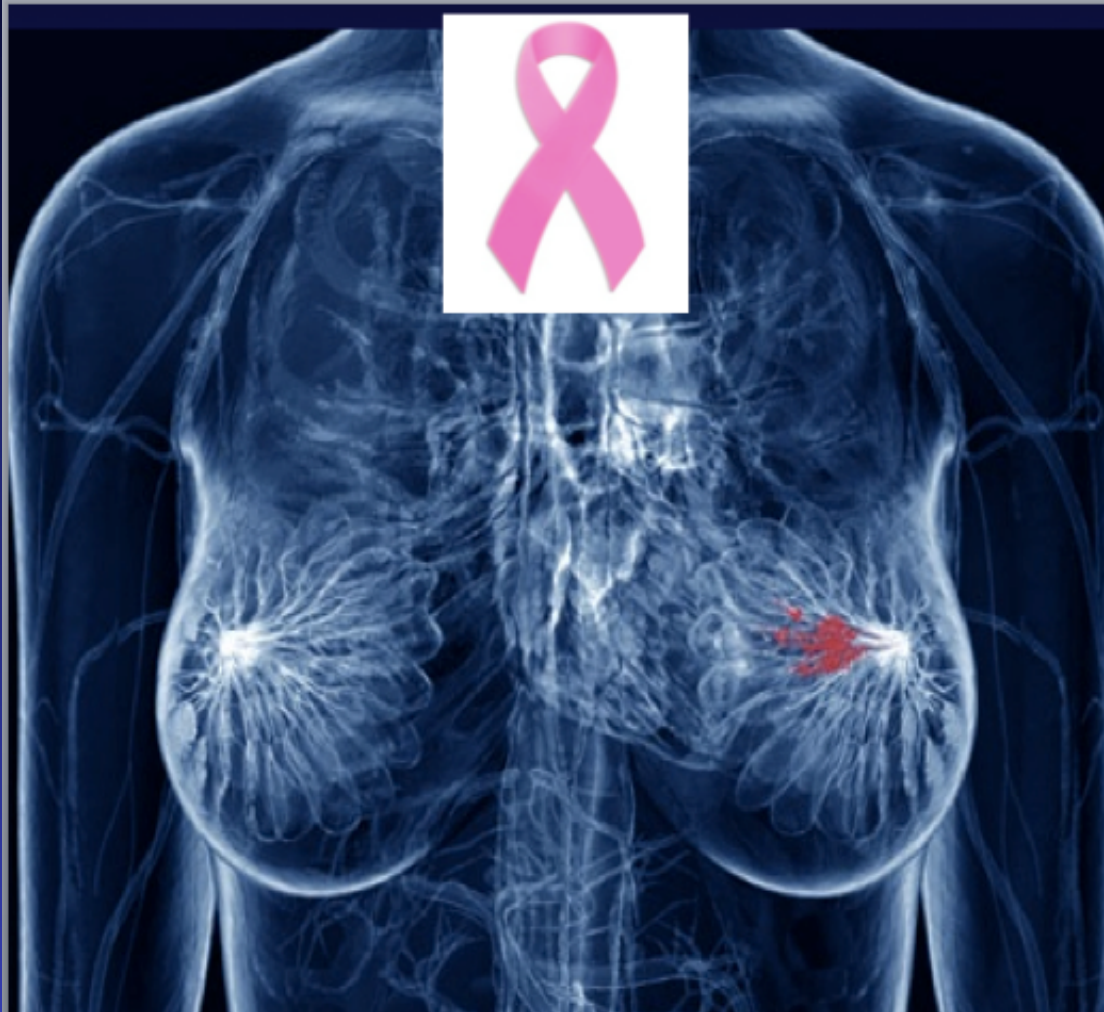
**Breast
& Brain**



**Nutritional
Adequacy**

**Anti-
Inflammation**

**Other
mechanisms**



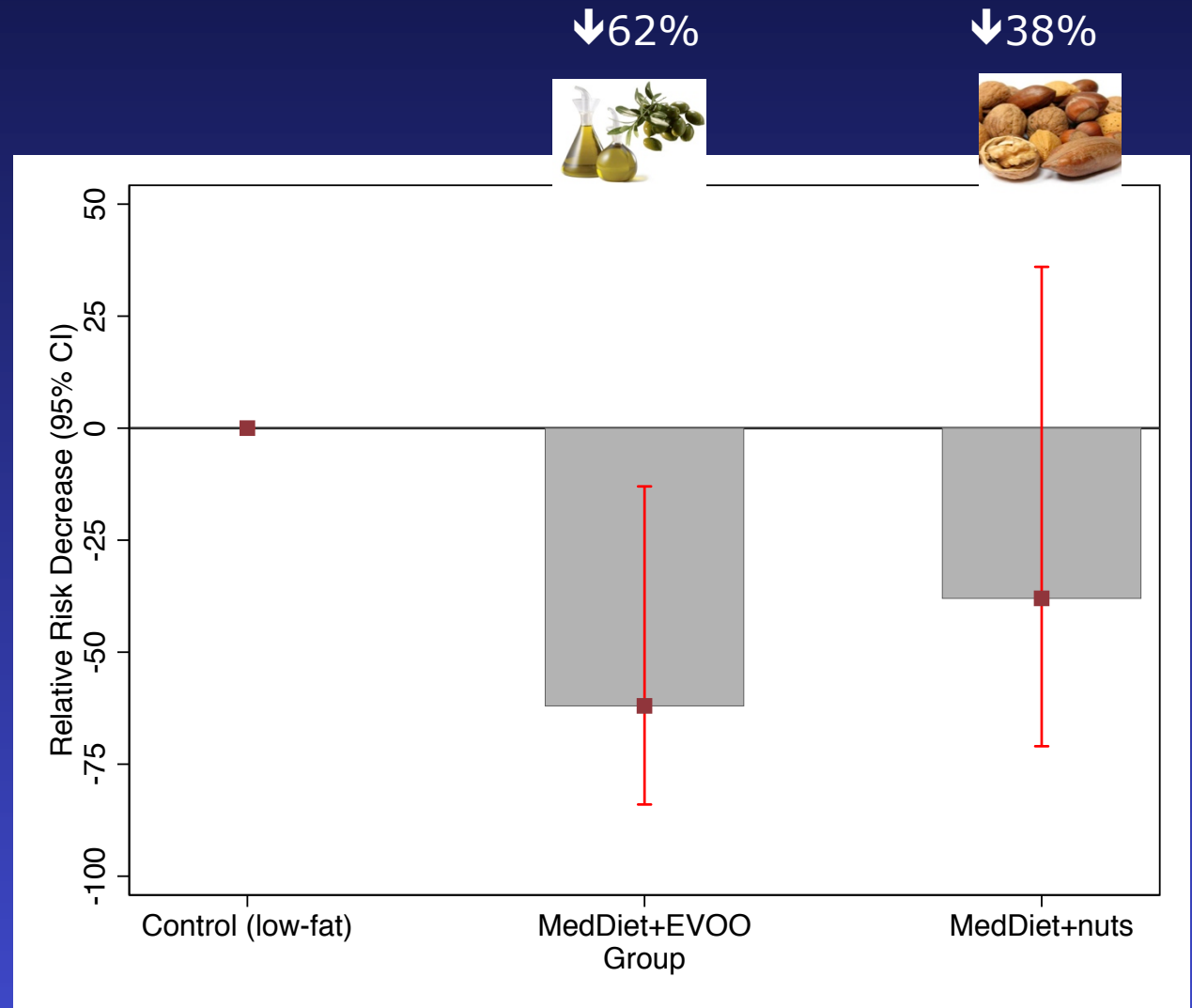
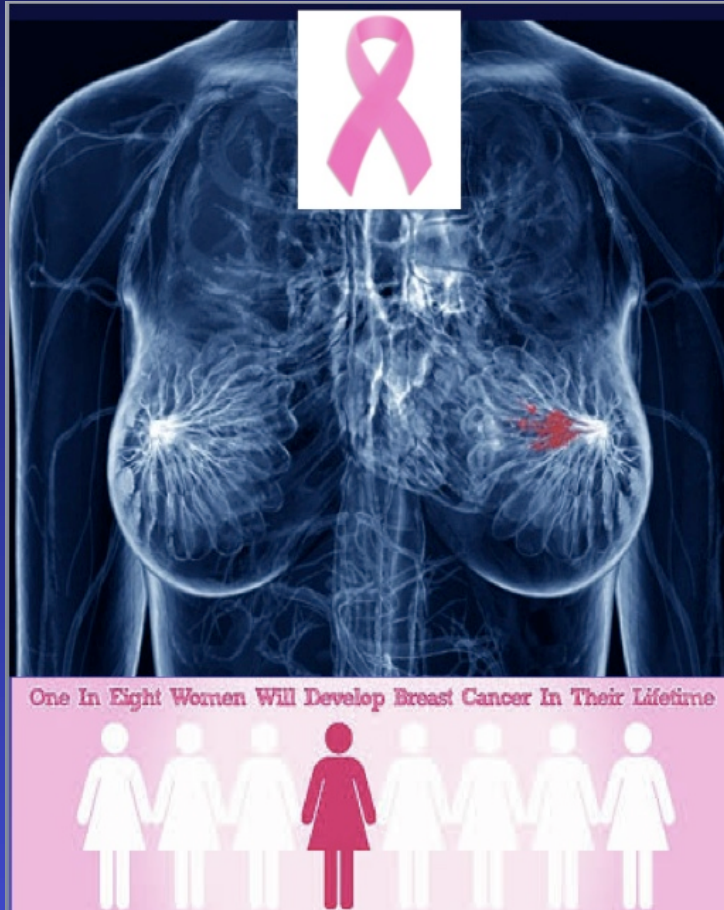
One In Eight Women Will Develop Breast Cancer In Their Lifetime



Early Detection Saves Lives.

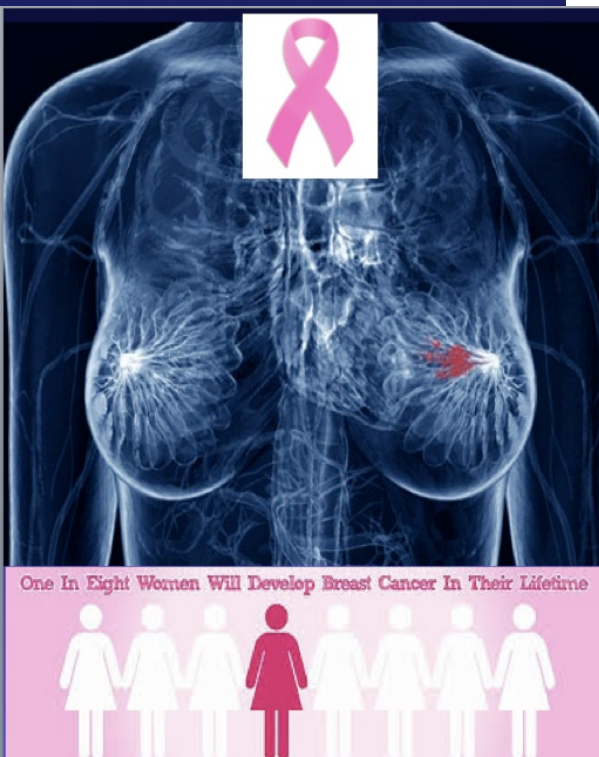


PREDIMED RCT. Breast cancer

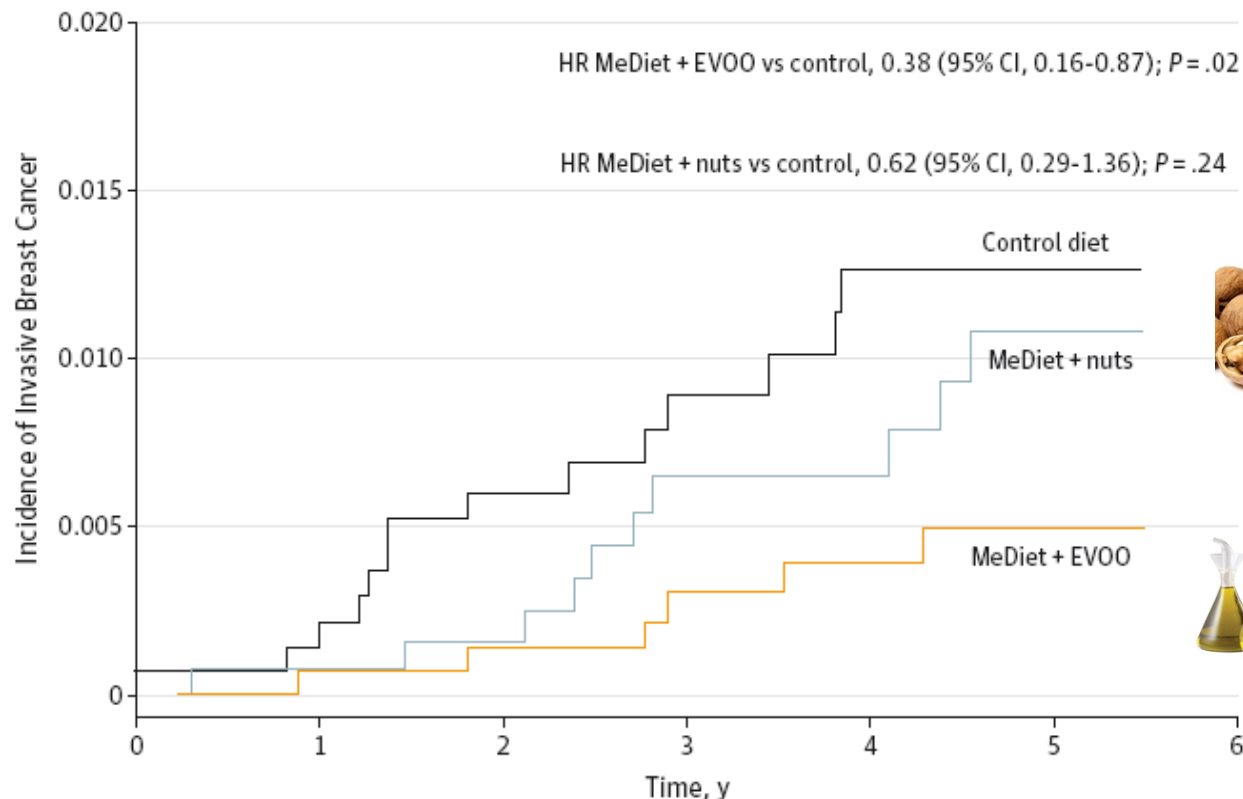


PREDIMED RCT. Breast cancer

Figure 1. Incidence of Invasive Breast Cancer, According to the Intervention Group



n = 4,152
35 cases
4.8 y follow-up



↓38%



↓62%



No. at risk						
MeDiet + EVOO	1476	1463	1369	1184	1013	785
MeDiet + nuts	1285	1271	1117	879	741	532
Control diet	1391	1353	1209	940	759	573

Recent reviews/meta-analyses on MeDiet & cognition/AD



Proceedings of the Nutrition Society (2013), **72**, 140–152
© The Authors 2012

doi:10.1017/S0029665112002959

Potential benefits of adherence to the Mediterranean diet on cognitive health

Catherine Féart*, Cecilia Samieri, Benjamin Allès and Pascale Barberger-Gateau
INSERM; University of Bordeaux, ISPED, Centre INSERM U897-Epidemiologie-Biostatistique, F-33000
Bordeaux, France

REVIEW ARTICLE

Mediterranean Diet, Cognitive Function, and Dementia A Systematic Review

Ilianna Lourida,^a Maya Soni,^b Joanna Thompson-Coon,^a Nitin Purandare,^{a†} Iain A. Lang,^{a,c}
Obioha C. Ukoumunne,^a and David J. Llewellyn^b

(*Epidemiology* 2013;24: 479–489)

Journal of Alzheimer's Disease 22 (2010) 715–740
DOI 10.3233/JAD-2010-100942
IOS Press

715

Review

Nutraceutical Properties of Mediterranean Diet and Cognitive Decline: Possible Underlying Mechanisms

Vincenza Frisardi^{a,*}, Francesco Panza^{b,*}, Davide Seripa^b, Bruno P. Imbimbo^c, Gianluigi Vendemiale^d,
Alberto Pilotto^b and Vincenzo Solfrizzi^a



Mediterranean diet and cognitive health: an update of available knowledge

Curr Opin Clin Nutr Metab Care. 2015;18:51-62

Catherine Feart, Cécilia Samieri, and Pascale Barberger-Gateau

Mediterranean Diet, Stroke, Cognitive Impairment, and Depression: A Meta-Analysis

Theodora Psaltopoulou, PhD,¹ Theodoros N. Sergentanis, MD,¹
Demosthenes B. Panagiotakos, PhD,² Ioannis N. Sergentanis, MD,^{1,3}
Rena Kostis, PhD,¹ and Nikolaos Scarmeas, MD, MSc, PhD^{4,5}

ANN NEUROL 2013;74:580–591

Journal of Alzheimer's Disease 39 (2014) 271–282
DOI 10.3233/JAD-130830
IOS Press

271

Association of Mediterranean Diet with Mild Cognitive Impairment and Alzheimer's Disease: A Systematic Review and Meta-Analysis

Balwinder Singh^{a,d}, Ajay K. Parsaik^a, Michelle M. Mielke^b, Patricia J. Erwin^c, David S. Knopman^a,
Ronald C. Petersen^{a,b} and Rosebud O. Roberts^{a,b,*}

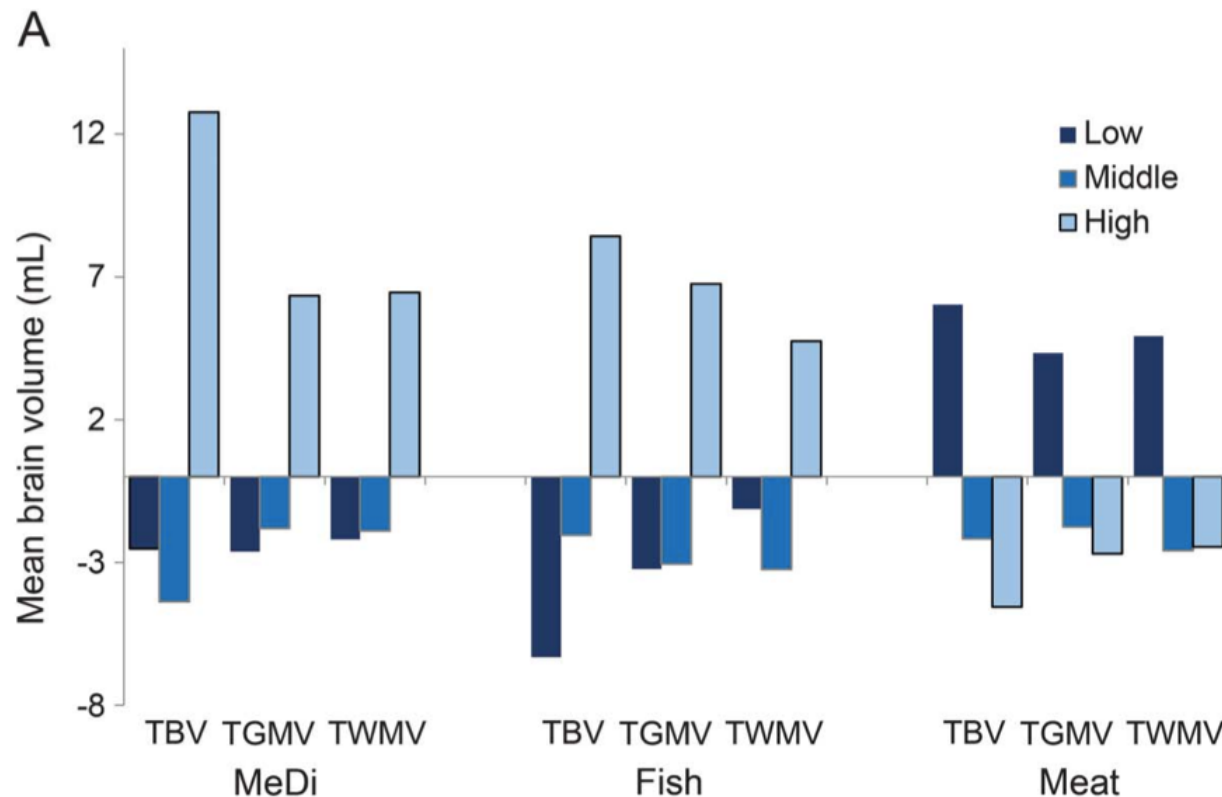
Mediterranean diet and brain structure in a multiethnic elderly cohort

WHICAP

Neurology 2015 Oct 21, epub ahead of print

Yian Gu, PhD
Adam M. Brickman, PhD
Yaakov Stern, PhD
Christian G. Habeck, PhD
Qolamreza R. Razlighi, PhD
José A. Luchsinger, PhD
Jennifer J. Manly, PhD
Nicole Schupf, PhD
Richard Mayeux, MD
Nikolaos Scarmeas, MD

Figure Association of Mediterranean diet, fish, and meat with brain volume and cortical thickness



674 elderly adults
without dementia
(mean age 80.1 years)

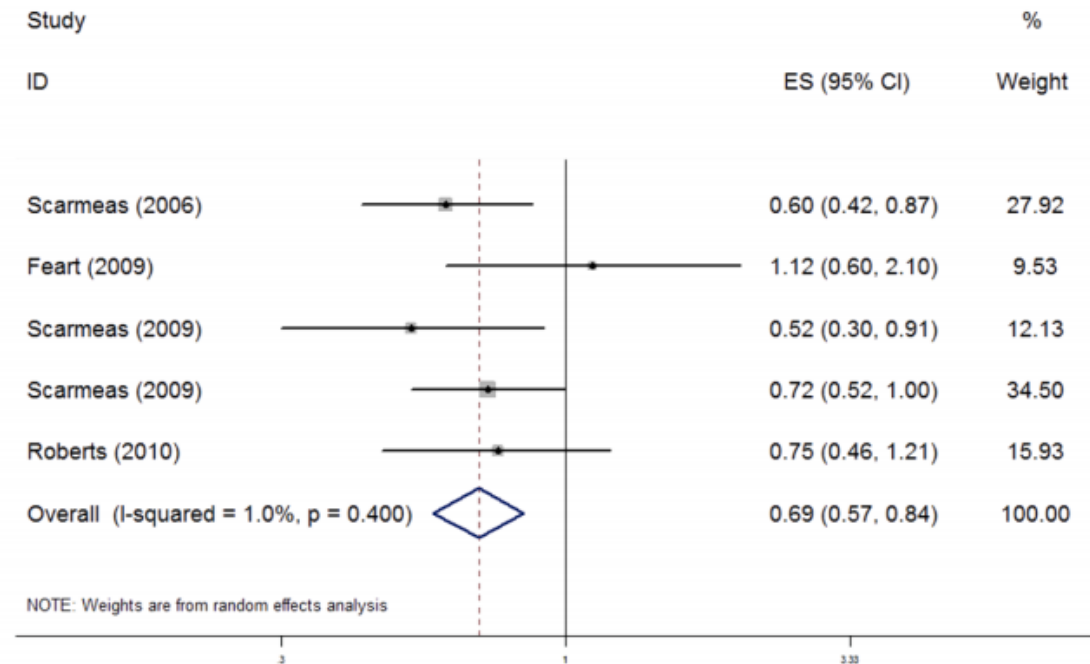
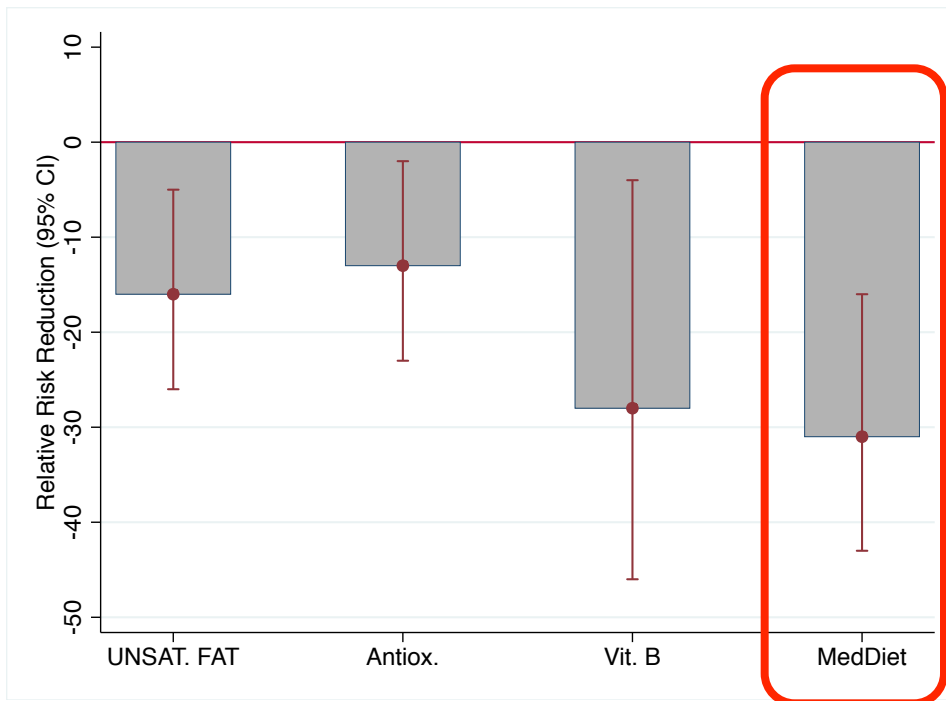
MRI scans using
FreeSurfer program.

Cross-sectional

Cohorts: Dietary patterns & dementia

Dietary Patterns and Risk of Dementia: a Systematic Review and Meta-Analysis of Cohort Studies

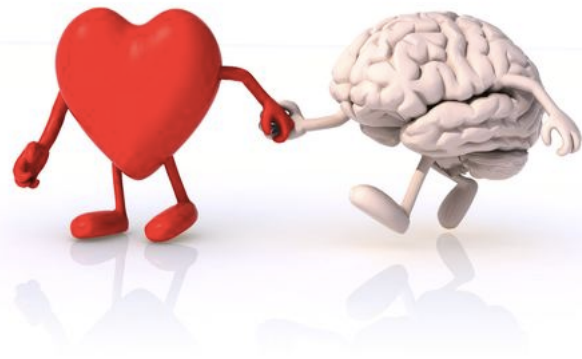
Lei Cao¹ • Lan Tan^{1,2} • Hui-Fu Wang¹ • Teng Jiang³ • Xi-Chen Zhu¹ • Huan Lu¹ • Meng-Shan Tan² • Jin-Tai Yu^{1,2,4}



Cao L, et al. Mol Neurobiol. **2015 Nov 9 online first.**

The Mediterranean Diet: Good for the Heart = Good for the Brain?

Barnes DE. *Ann Neurol* 2011;69:226-8.



COMMENTARY

Mediterranean Diet and Cognitive Outcomes *Epidemiological Evidence Suggestive, Randomized Trials Needed*

Cinta Valls-Pedret and Emilio Ros

Epidemiology • Volume 24, Number 4, July 2013

PREDIMED-BARCELONA RCT. Cognitive change

Mediterranean Diet and Age-Related Cognitive Decline A Randomized Clinical Trial

Cinta Valls-Pedret, MSc; Aleix Sala-Vila, DPharm, PhD; Mercè Serra-Mir, RD; Dolores Corella, DPharm, PhD; Rafael de la Torre, DPharm, PhD;
Miguel Ángel Martínez-González, MD, PhD; Elena H. Martínez-Lapiscina, MD, PhD; Montserrat Fitó, MD, PhD; Ana Pérez-Heras, RD;
Jordi Salas-Salvadó, MD, PhD; Ramon Estruch, MD, PhD; Emilio Ros, MD, PhD

JAMA Intern Med 2015;175:1094-1103.

Randomized trial with 343 PREDIMED participants

At baseline and after intervention for 4.1 y:

- Battery 9 neuropsychological tests

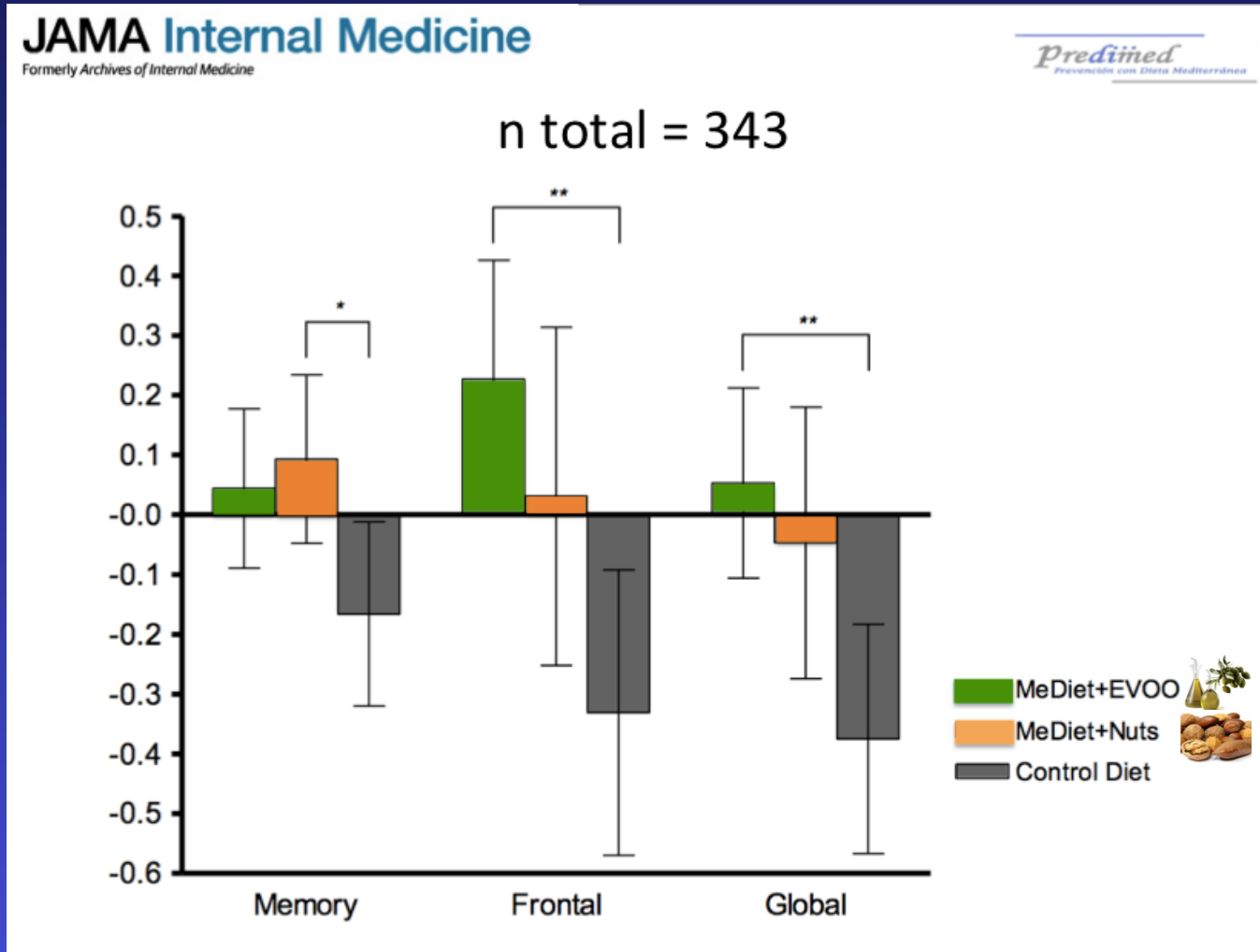
Changes in neuropsychological tests in 3 cognition composites:

- memory
- frontal functions
- global cognition

Changes adjusted for socio demographic variables, energy intake, vascular risk factors, APOE, and follow-up time.

PREDIMED-BARCELONA RCT. Cognitive change

Changes of mean z scores (final minus baseline)



Valls-Pedret C, et al. JAMA Intern Med 2015;175:1094-103.

Depression



Table 1. DSM-5 Diagnostic Criteria for Major Depressive Disorder.*

Five or more of the following symptoms must be present nearly every day during a 2-wk period:

Core symptoms (≥ 1 required for diagnosis)

Depressed mood most of the day

Anhedonia or markedly decreased interest or pleasure in almost all activities

Additional symptoms

Clinically significant weight loss or increase or decrease in appetite

Insomnia or hypersomnia

Psychomotor agitation or retardation

Fatigue or loss of energy

Feelings of worthlessness or excessive or inappropriate guilt

Diminished ability to think or concentrate, or indecisiveness

Recurrent thoughts of death or suicidal ideation

* DSM-5 denotes *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition.

Yearly Prevalence: 5%

Lifetime risk

Women: 20%



Men: 12%



PREDIMED. Depression

Sánchez-Villegas et al. *BMC Medicine* 2013, **11**:208
<http://www.biomedcentral.com/1741-7015/11/208>



RESEARCH ARTICLE

Open Access

Mediterranean dietary pattern and depression: the PREDIMED randomized trial

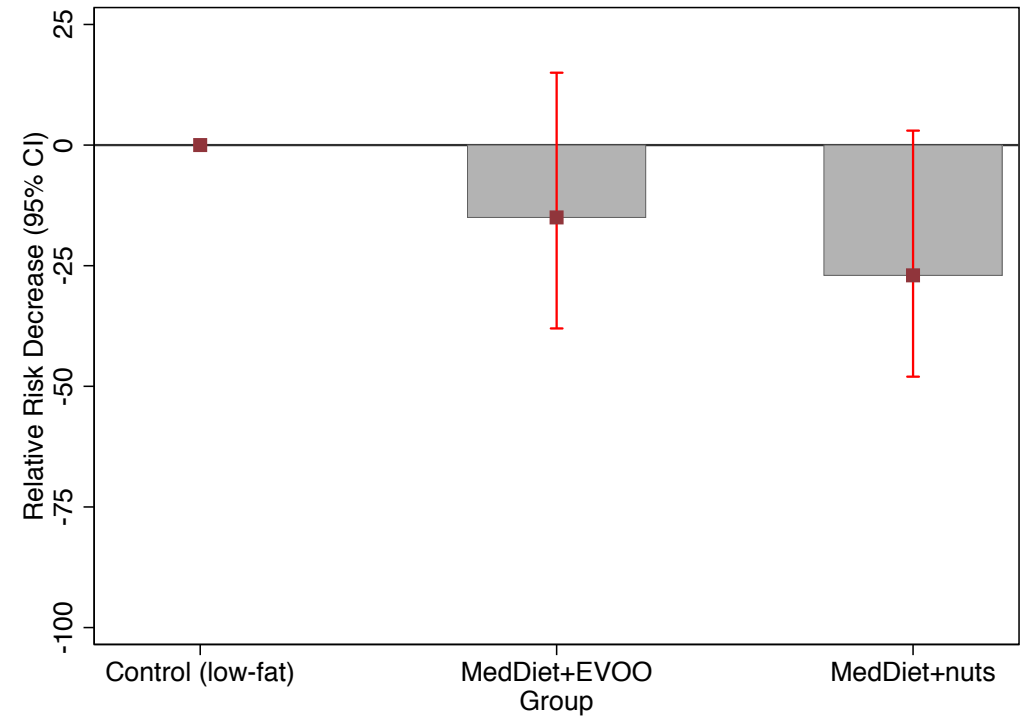
Almudena Sánchez-Villegas^{1,2*}, Miguel Angel Martínez-González^{1,3}, Ramón Estruch^{1,4}, Jordi Salas-Salvadó^{1,5},



↓15%



↓27%



Sánchez-Villegas A, et al. *BMC Med* 2013;11:208.

Association of the Mediterranean Dietary Pattern With the Incidence of Depression

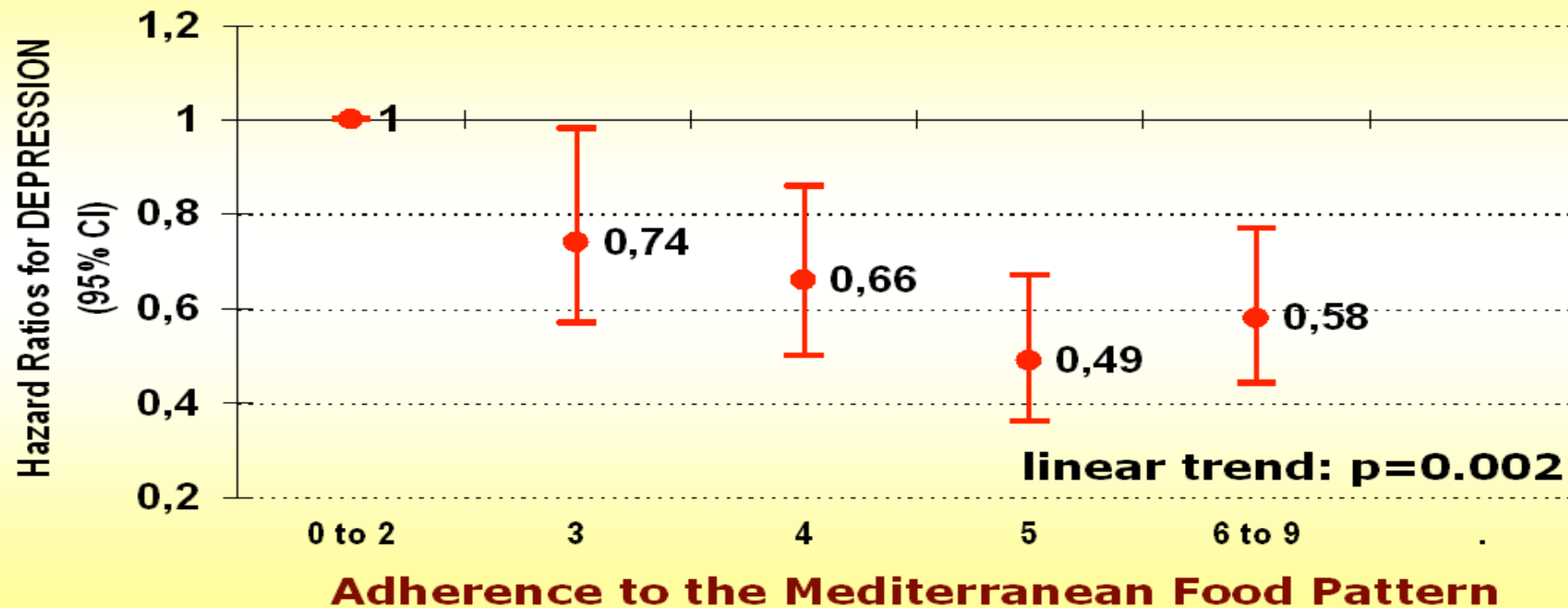
The Seguimiento Universidad de Navarra/University of Navarra Follow-up (SUN) Cohort

Almudena Sánchez-Villegas, BPharm, PhD; Miguel Delgado-Rodríguez, MD, PhD, MPH; Alvaro Alonso, MD, PhD; Javier Schlatter, MD, PhD; Francisca Lahortiga, BA, PhD; Lluís Serra Majem, MD, PhD; Miguel Ángel Martínez-González, MD, PhD, MPH

Sanchez Villegas A, et al.
Arch Gen Psychiatry 2009;66:1090-1098



Incident cases of depression (480 new diagnoses) 4.4 yr median follow-up (n= 10 094)



Adjusted for sex, age, smoking (3), leisure time physical activity (5), total energy intake, BMI, energy intake and employment status

Mediterranean dietary pattern and prevalence and incidence of depressive symptoms in mid-aged women: results from a large community-based prospective study

Eur J Clin Nutr 2012

J Rienks^{1,2}, AJ Dobson² and GD Mishra²

Australian Longitudinal Study on Women's Health

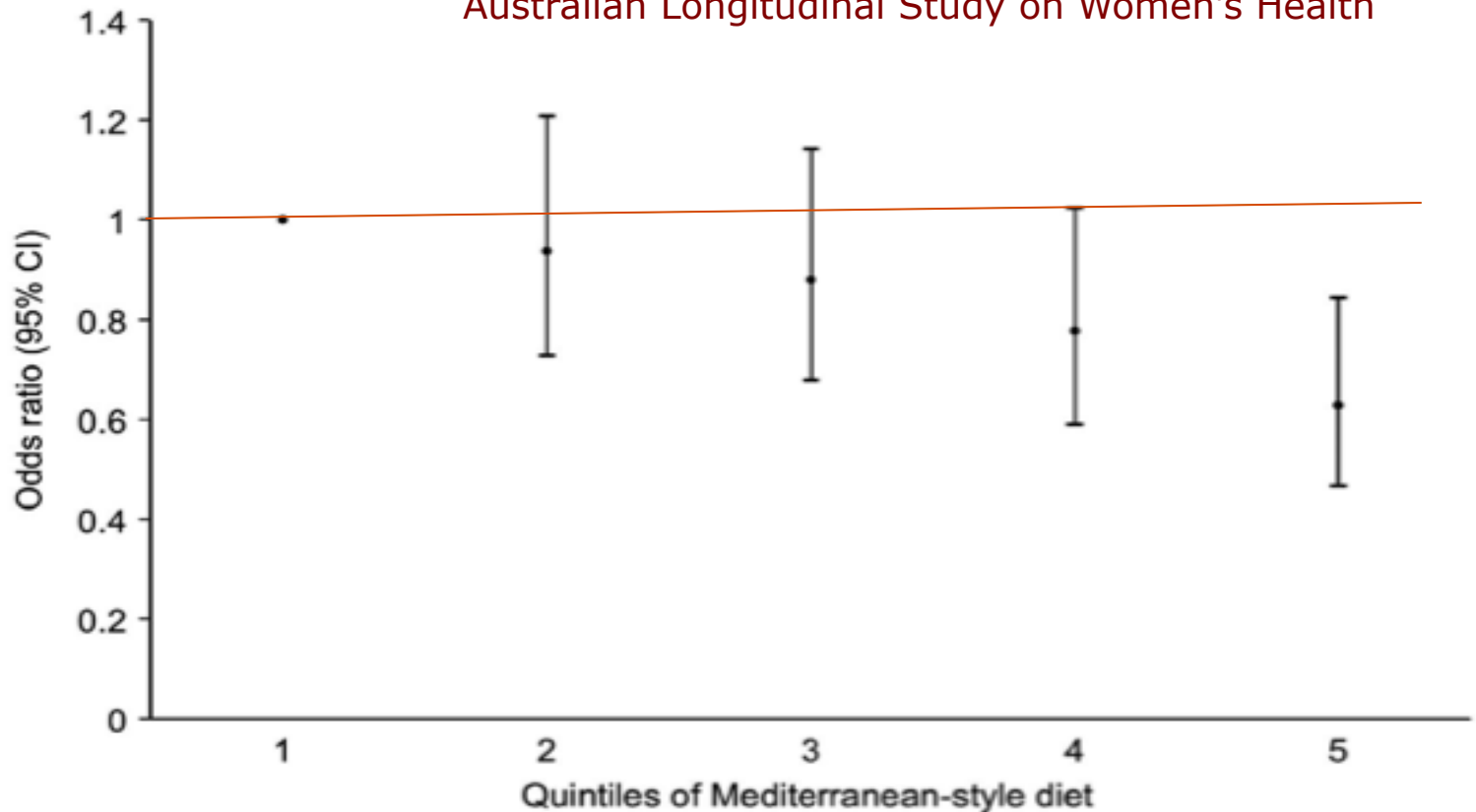


Figure 2. Association between quintiles of Mediterranean-style diet and Centre for Epidemiological Studies Depression Scale score ≥ 10 , adjusted odds ratio and 95% confidence intervals. Quintile 1 is the reference group and has the lowest intake. Dots represent odds ratios; extended lines show 95% confidence intervals.

Consumption of a 'Mediterranean-style' dietary pattern by mid-aged women (n=6060) may have a protective influence against the onset of depressive symptoms.

(...) dietary patterns have a potential role in the prevention and management of depressive symptoms.

A systematic review and meta-analysis of dietary patterns and depression in community-dwelling adults¹⁻³

Am J Clin Nutr 2013

Jun S Lai, Sarah Hiles, Alessandra Bisquera, Alexis J Hure, Mark McEvoy, and John Attia

Most of the observational studies were cross-sectional ($n = 13$) and measured dietary intake and depression concurrently (17, 18, 20–24, 26–29, 31, 34). Four were prospective cohorts that measured dietary intake at baseline and used repeated measures of depression outcomes at baseline and at each follow-up (30, 32, 33, 35). Another 2 prospective cohort studies used repeated measure of dietary intake and depression outcomes at baseline and at every follow-up (19, 36).

1. Sanchez-Villegas et al, 2009
2. Akbaraly et al, 2009+2013
3. Tsai et al, 2012
4. Skarupski et al, 2013
5. Chocano-Bedoya et al, 2013
6. Rienks et al, 2013.

1. Sanchez-Villegas et al, 2009
2. Akbaraly et al, 2009+2013
3. Tsai et al, 2012
4. Skarupski et al, 2013
5. Chocano-Bedoya et al, 2013
6. Rienks et al, 2013

MeDiet

MeDiet

MeDiet

Outline

**PREDIMED
RCT**

CV+

**Breast &
Brain**

**Nutritional
Adequacy**

**Anti-
Inflammation**

**Other
mechanisms**

Outline

**PREDIMED
RCT**

CV+

**Breast &
Brain**

**Nutritional
Adequacy**

**Anti-
Inflammation**

**Other
mechanisms**

MeDiet: a high-quality diet

The shortest way to reach nutritional goals is to adopt Mediterranean food choices: evidence from computer-generated personalized diets¹⁻³

Matthieu Maillot, Carine Issa, Florent Vieux, Denis Lairon, and Nicole Darmon

Results: Compared with the observed intakes, fulfilling the whole set of nutrient constraints systematically decreased total fats and increased total carbohydrates, even in the absence of specific constraints on those macronutrients. For whichever model used, a strong consistency was observed in the dietary changes needed to fulfill the constraints, and the greatest increases were seen for unsalted nuts, unrefined grains, legumes, fruit, fish and shellfish, and vegetables.

Conclusion: Whether recommendations on total fats, MUFAs, or total carbohydrates are included or not in the definition of overall nutrient adequacy, foods typical of the Mediterranean diet are needed to reach overall nutrient adequacy. *Am J Clin Nutr* 2011;94:1127-37.

Maillot M, et al. *Am J Clin Nutr* 2011;94:1127-37.

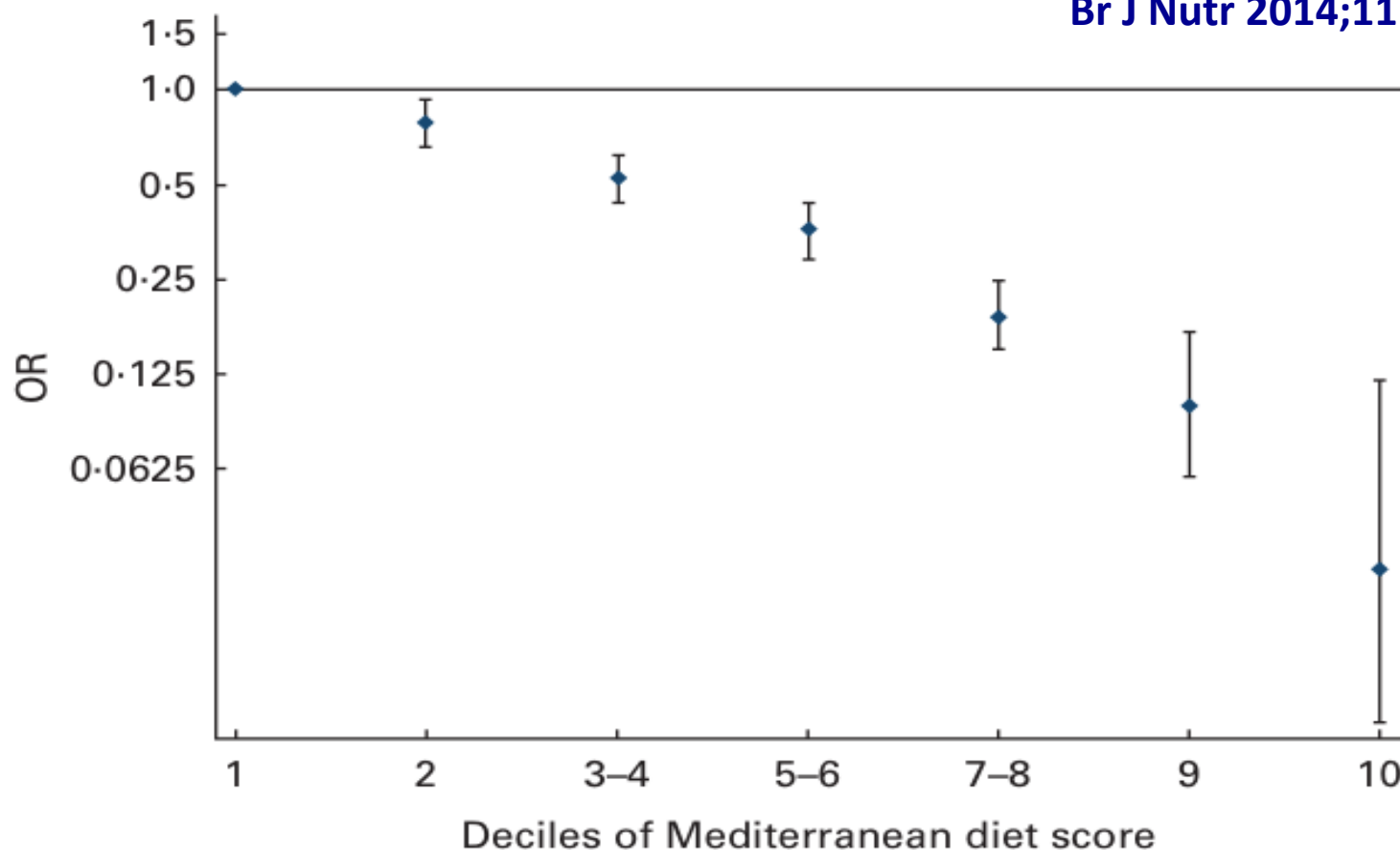


Fig. 2. Risk of failing to meet ≥ 4 dietary recommended intakes according to deciles of Mediterranean diet score in 16 841 participants of the Seguimiento Universidad de Navarra (SUN) Project using the probabilistic approach.

We evaluated the intakes of

- Zn
- I
- Se
- Fe
- Ca
- K
- P
- Mg
- Cr

and vitamins

- B1
- B2
- B3
- B6
- B12
- C
- A
- D
- E
- folic acid.

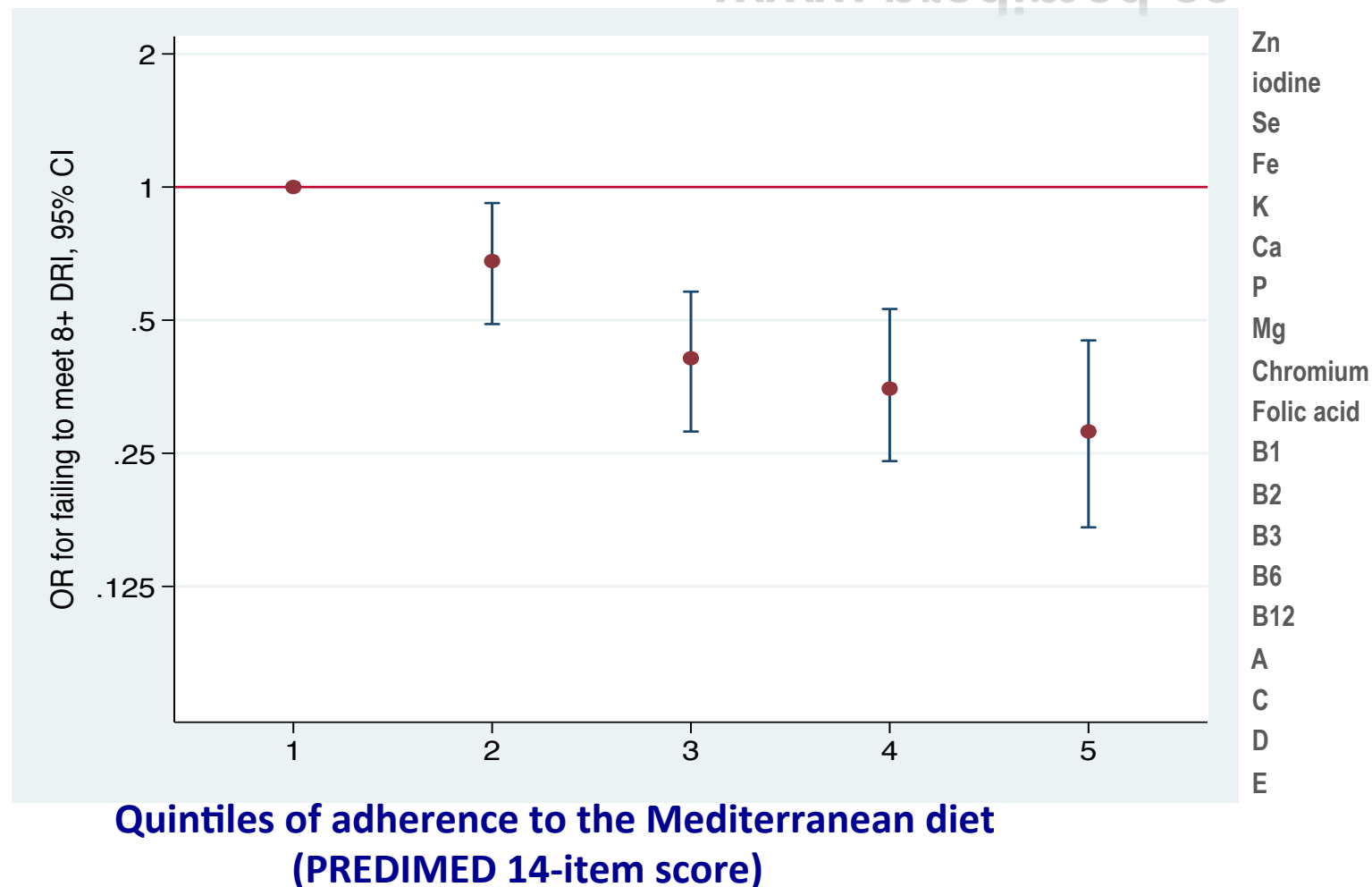
Nutritional adequacy according to carbohydrates and fat quality

Ana Sánchez-Tainta · Itziar Zazpe · Maira Bes-Rastrollo · Jordi Salas-Salvadó · Mónica Bullo · José Vicente Sorlí · Dolores Corella · M^a Isabel Covas · Fernando Arós · Mario Gutierrez-Bedmar · Miquel Fiol · F. García de la Corte · Lluís Serra-Majem · Xavier Pinto · Helmut Schröder · Emilio Ros · M. Carmen López-Sabater · Ramón Estruch · Miguel Angel Martínez-González · For the PREDIMED study investigators

www.predimed.es

Received: 26 May 2014 / Accepted: 23 December 2014
© Springer-Verlag Berlin Heidelberg 2015

MeDiet: a high-quality diet



Outline

**PREDIMED
RCT**

CV+

**Breast &
Brain**

**Nutritional
Adequacy**

**Anti-
Inflammation**

**Other
mechanisms**

Outline

**PREDIMED
RCT**

CV+

**Breast &
Brain**

**Nutritional
Adequacy**

**Anti-
Inflammation**

**Other
mechanisms**

REVIEW

MECHANISM

Inflammation, Immunity, and Coronary Artery Disease

Göran K. Hansson

RECENT RESEARCH HAS SHOWN that inflammation plays a central role in coronary artery disease (CAD). Immune cells dominate early atherosclerotic lesions, and inflammation accelerates progression of the lesions, and is associated with coronary syndromes. This review highlights

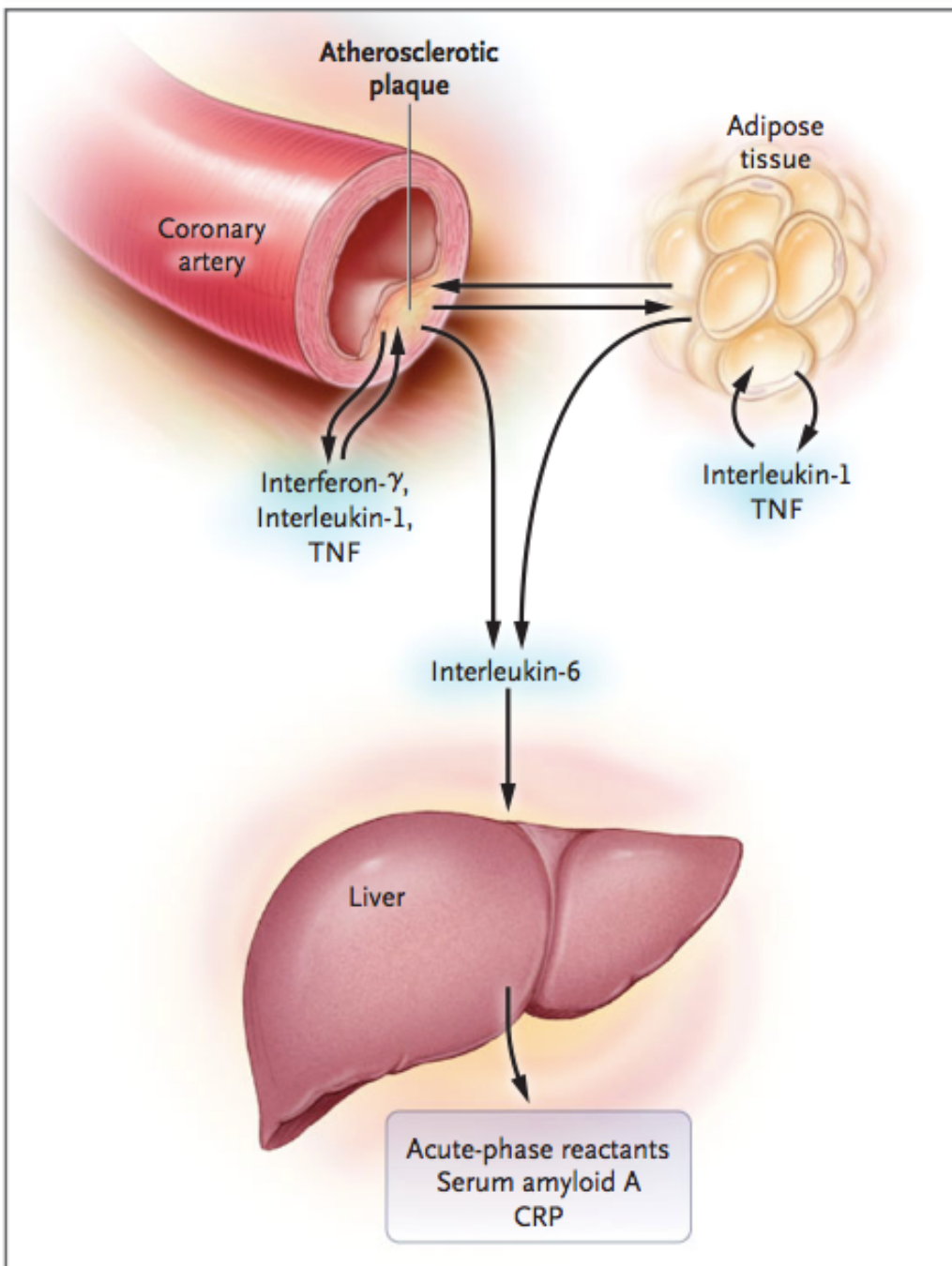


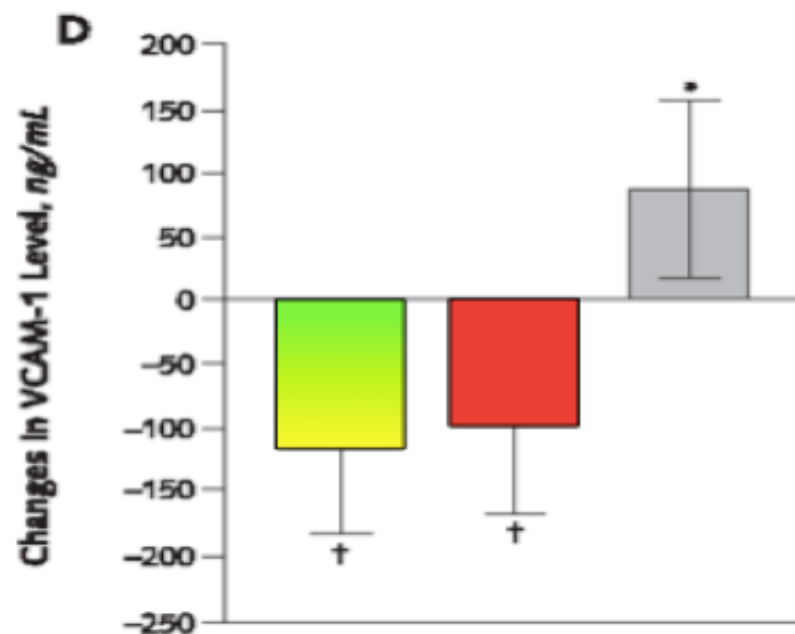
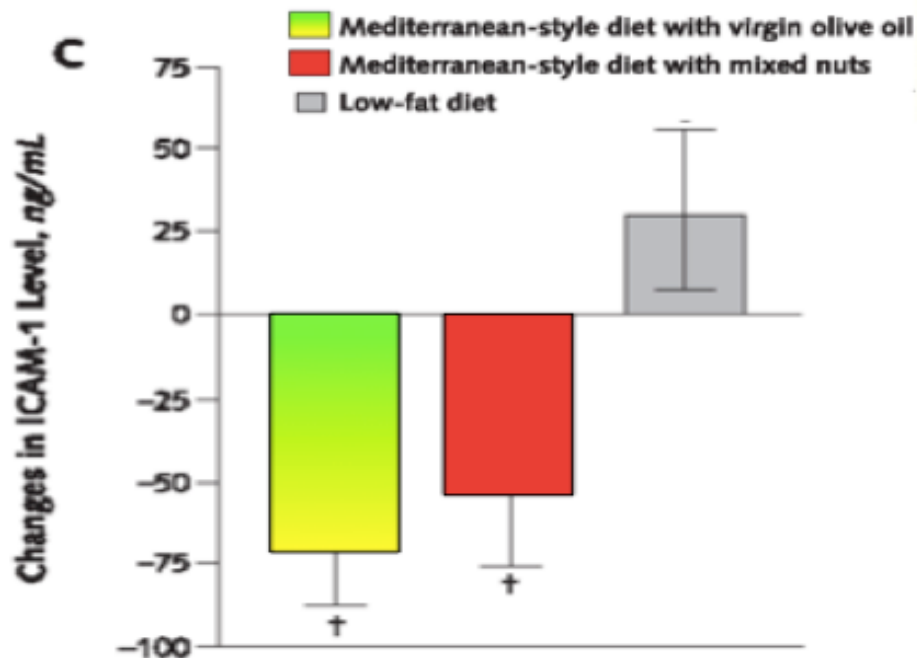
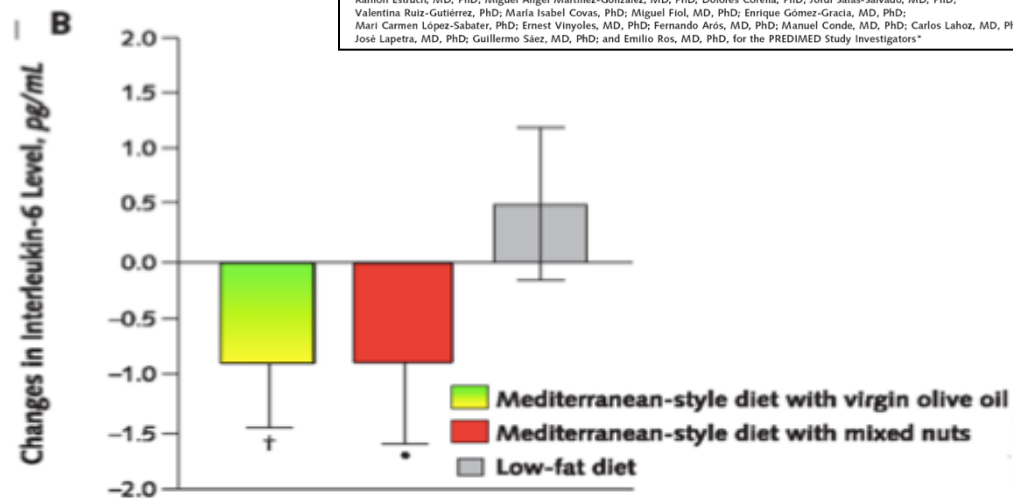
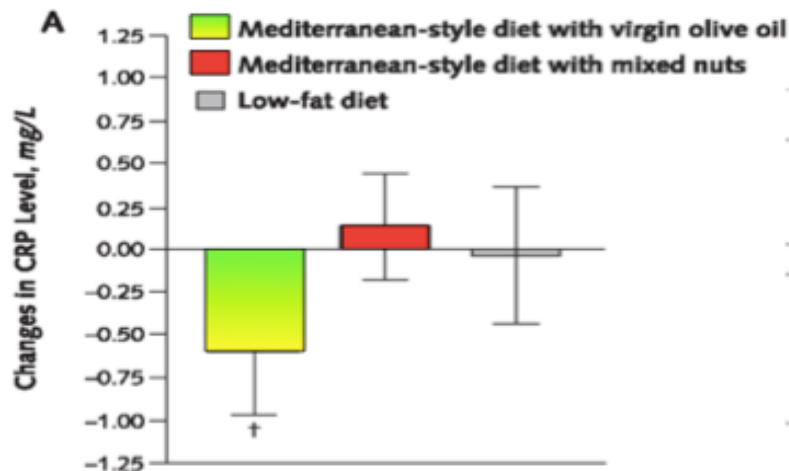
Figure 5. The Cytokine Cascade.

3-mo changes,
n= 772.

Effects of a Mediterranean-Style Diet on Cardiovascular Risk Factors

A Randomized Trial

Ramon Estruch, MD, PhD; Miguel Angel Martínez-González, MD, PhD; Dolores Corella, PhD; Jordi Salas-Salvadó, MD, PhD; Valentín Ruiz-Gutiérrez, PhD; María Isabel Covas, PhD; Miguel Fiol, MD, PhD; Enrique Gómez-Gracia, MD, PhD; Mari Carmen López-Sabater, PhD; Ernest Vinayoles, MD, PhD; Fernando Arós, MD, PhD; Manuel Conde, MD, PhD; Carlos Lahoz, MD, PhD; José Lapetra, MD, PhD; Guillermo Sáez, MD, PhD; and Emilio Ros, MD, PhD, for the PREDIMED Study Investigators*



Mediterranean dietary pattern, inflammation and endothelial function: A systematic review and meta-analysis of intervention trials

L. Schwingshackl*, G. Hoffmann

Nutr Metab Cardiovasc Dis 2014;24:929-39

Outcomes	No. of studies	Sample size	MD	95% CI	p-values	Inconsistency I^2
CRP (mg/l)	14	1942	-0.98	[-1.48, -0.49]	<0.0001	91%
IL-6 (pg/ml)	6	1077	-0.42	[-0.73, -0.11]	0.008	81%
AD (µg/ml)	2	286	1.69	[0.27, 3.11]	0.02	78%
FMD (%)	2	210	1.86	[0.23, 3.48]	0.02	43%
ICAM-1 (ng/ml)	2	586	-23.73	[-41.24, -6.22]	0.008	34%
E-Selectin (ng/ml)	2	161	-0.67	[-6.51, 5.16]	0.82	20%

Abbreviations: AD, adiponectin; CRP, high sensitive C-reactive protein; FMD, flow mediated dilatation; ICAM-1, Intercellular Adhesion Molecule 1; IL-6, Interleukin 6; VCAM-1, Vascular Adhesion Molecule 1.

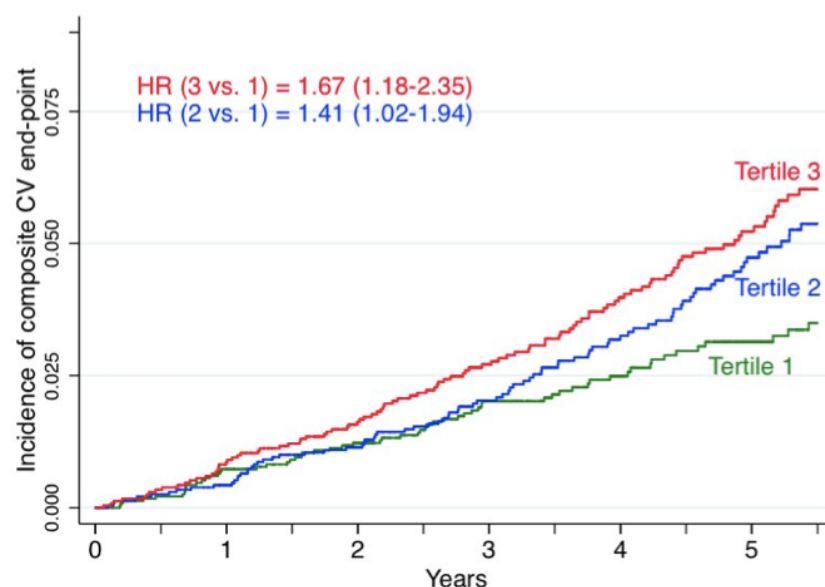
Dietary Inflammatory Index and Incidence of Cardiovascular Disease in the PREDIMED Study

Predimed
Prevención con Dieta Mediterránea

277 cases
4.8 y follow-up

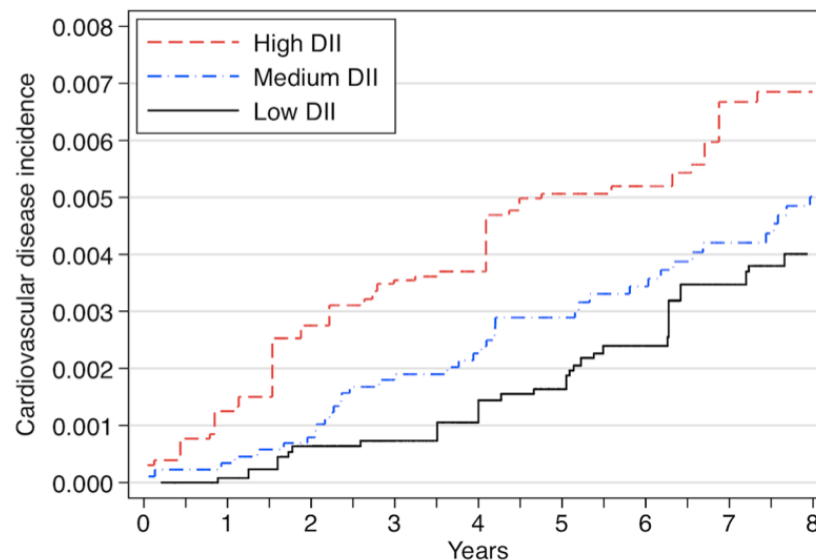
Ramallal R, et al. PLoS ONE 2015;10:e0135221

Dietary Inflammatory Index and Incidence of Cardiovascular Disease in the SUN Cohort



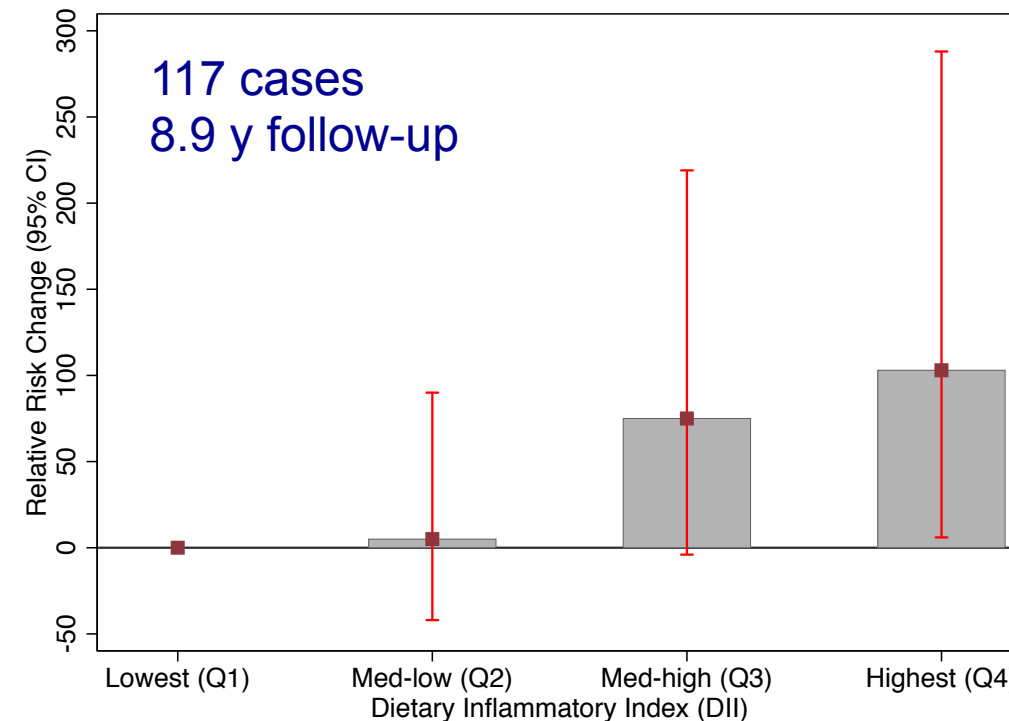
Number at risk

DII = Tertile 1	2406	2300	2087	1698	1322	974
DII = Tertile 2	2405	2303	2074	1675	1416	1070
DII = Tertile 3	2405	2299	2089	1701	1470	1133



Number at risk

Q4 (high DII)	4698	4684	4663	4447	4383	3914	3820	3199	3110
Q2/Q3 (medium DII)	9397	9388	9350	8932	8824	7955	7765	6364	6165
Q1 (low DII)	4699	4695	4671	4457	4415	3960	3875	3100	3002



Outline

**PREDIMED
RCT**

CV+

**Breast &
Brain**

**Nutritional
Adequacy**

**Anti-
Inflammation**

**Other
mechanisms**

Outline

**PREDIMED
RCT**

CV+

**Breast &
Brain**

**Nutritional
Adequacy**

**Anti-
Inflammation**

**Other
mechanisms**

Other mechanisms

J Am Coll Cardiol 2011;57:1299–313

- Changes in CV risk factors

The Effect of Mediterranean Diet on Metabolic Syndrome and its Components

A Meta-Analysis of 50 Studies and 534,906 Individuals

Christina-Maria Kastorini, MSc,*† Haralampos J. Milionis, MD, PhD,†
Katherine Esposito, MD, PhD,‡ Dario Giugliano, MD, PhD,‡ John A. Goudevenos, MD, PhD,†
Demosthenes B. Panagiotakos, PhD*

Annals of Internal Medicine

ARTICLE

Effects of a Mediterranean-Style Diet on Cardiovascular Risk Factors A Randomized Trial

Ramon Estruch, MD, PhD; Miguel Angel Martinez-Gonzalez, MD, PhD; Dolores Corella, PhD; Jordi Salas-Salvado, MD, PhD;
Valentina Ruiz-Gutierrez, PhD; Maria Isabel Covas, PhD; Miguel Fiol, MD, PhD; Enrique Gomez-Gracia, MD, PhD;
Mari Carmen Lopez-Sabater, PhD; Ernest Vinayoles, MD, PhD; Fernando Azis, MD, PhD; Manuel Conde, MD, PhD; Carlos Lahoz, MD, PhD;
José Lapetra, MD, PhD; Guillermo Sáez, MD, PhD; and Emilio Ros, MD, PhD, for the PREDIMED Study Investigators*

Ann Intern Med 2006;145:1-11

- Antioxidant effects

– LDL

Effect of a Traditional Mediterranean Diet on Lipoprotein Oxidation

A Randomized Controlled Trial

Fito M, et al. Arch Intern Med. 2007;167:1195-1203

– DNA

The Mediterranean diet improves the systemic lipid and DNA oxidative damage in metabolic syndrome individuals. A randomized, controlled, trial

Mitjavila MT, et al. Clin Nutr. 2013;32:172-8

- Telomere length

Mediterranean diet and telomere length in Nurses' Health Study: population based cohort study

OPEN ACCESS

Marta Crous-Bou postdoctoral research fellow¹ research fellow², Teresa T Fung associate professor³
adjunct associate professor⁴, Jennifer Prescott instructor in medicine¹, Bettina Julin postdoctoral
research fellow¹ research fellow², Mengmeng Du postdoctoral research fellow¹ research fellow⁵,
Qi Sun assistant professor^{1,4}, Kathryn M Rexrode associate professor⁷, Frank B Hu professor^{1,2,4},
Immaculata De Vivo associate professor^{1,2}

BMJ 2014;349:g6674



Thank you for your attention!
mamartinez@unav.es
[@MAM_UNAV](https://twitter.com/MAM_UNAV)



Clínica
Universidad de Navarra



cima

CENTRO DE INVESTIGACIÓN MÉDICA APLICADA
UNIVERSIDAD DE NAVARRA



IESE
Business School
Universidad de Navarra

Table S6. Mean Baseline Values and Changes in the Consumption of Key Foods in the three Arms of the Study.

Within group (95 % CI) changes and between-group changes for the 2 groups receiving the Mediterranean diet intervention (versus the control diet) are shown. The change is follow-up minus baseline; hence a positive sign indicates increase over time (the last available follow-up food frequency questionnaire of each participant was used).

	Mean baseline			Within-group mean changes			Between-group changes (differences vs.control)			
	MeDiet + EVOO (n = 2364)	MeDiet + Nuts (n = 2108)	Control diet (n = 1941)	MeDiet + EVOO	MeDiet + Nuts	Control diet	MeDiet + EVOO vs. Control diet		MeDiet + nuts vs. Control diet	
Servings/d	Mean (SD)			Mean (95% CI)			Mean (95% CI)	P value	Mean (95% CI)	P value
Virgin olive oil (10 g)	2.1 ± 2.3	2.2 ± 2.3	2.0 ± 2.3	2.93 (2.82, 3.04)	0.99 (0.88, 1.11)	0.27 (0.16, 0.38)	2.66 (2.47, 2.86)	< 0.001	0.72 (0.53, 0.92)	< 0.001
Refined- mixed olive oil (10 g)	1.8 ± 2.0	1.6 ± 2.0	1.7 ± 2.0	-1.71 (-1.80, -1.62)	-0.57 (-0.67, -0.47)	-0.44 (-0.55, -0.34)	-1.27 (-1.10, -1.43)	< 0.001	-0.13 (-0.30, 0.05)	0.24
Total nuts (25 g)	0.4 ± 0.5	0.5 ± 0.6	0.4 ± 0.5	0.001 (-0.03, 0.03)	0.71 (0.67, 0.75)	-0.13 (-0.16, -0.11)	0.13 (0.09, 0.18)	< 0.001	0.84 (0.78, 0.90)	< 0.001
Vegetables (125 g)	2.8 ± 1.2	2.7 ± 1.2	2.6 ± 1.1	-0.08 (-0.13, -0.01)	-0.01 (-0.06, 0.05)	-0.09 (-0.14, -0.03)	0.014 (-0.08, 0.11)	0.98	0.08 (-0.01, 0.18)	0.12
Wholegrain cereal (60 g)	0.5 ± 1.0	0.5 ± 0.9	0.5 ± 0.9	-0.05 (-0.10, -0.01)	-0.03 (-0.07, 0.02)	-0.04 (-0.09, 0.01)	-0.01 (-0.09, 0.05)	0.98	0.01 (-0.07, 0.09)	0.98
Refined cereal and potatoes (60 g)	3.3 ± 1.9	3.3 ± 1.7	3.2 ± 1.8	-0.29 (-0.37, -0.21)	-0.34 (-0.42, -0.26)	-0.31 (-0.39, -0.23)	0.02 (-0.12, 0.16)	0.98	-0.03 (-0.17, 0.11)	0.94
Legumes (40 g)	0.5 ± 0.3	0.5 ± 0.4	0.5 ± 0.3	0.06 (0.04, 0.07)	0.06 (0.04, 0.08)	0.002 (-0.01, 0.02)	0.06 (0.03, 0.08)	< 0.001	0.06 (0.003, 0.08)	< 0.001
Fruits (125 g)	3.0 ± 1.7	3.0 ± 1.6	2.8 ± 1.6	0.21 (0.13, 0.28)	0.25 (0.17, 0.33)	0.15 (0.07, 0.23)	0.05 (-0.09, 0.19)	0.75	0.10 (-0.04, 0.24)	0.25
Fish or seafood (125)	0.8 ± 0.4	0.8 ± 0.4	0.8 ± 0.4	0.01 (-0.01, 0.03)	0.02 (0.001, 0.04)	-0.03 (-0.05, -0.01)	0.04 (0.01, 0.07)	0.01	0.05 (0.02, 0.08)	0.001
Meat or meat products (150 g)	0.9 ± 0.4	0.9 ± 0.4	0.8 ± 0.4	-0.11 (-0.12, -0.09)	-0.11 (-0.13, -0.10)	-0.10 (-0.11, -0.08)	-0.01 (-0.04, 0.02)	0.72	-0.01 (-0.01, 0.04)	0.53
Pastries, cakes or sweets (50 g)	0.4 ± 0.5	0.4 ± 0.6	0.4 ± 0.5	-0.07 (-0.10, -0.05)	-0.09 (-0.12, -0.06)	-0.06 (-0.09, -0.03)	-0.01 (-0.06, 0.03)	0.86	-0.03 (-0.08, 0.02)	0.41
Dairy products (200 g)	1.9 ± 1.1	1.9 ± 1.1	1.9 ± 1.1	-0.07 (-0.12, -0.02)	-0.05 (-0.09, 0.003)	-0.08 (-0.13, -0.04)	0.02 (-0.07, 0.10)	0.96	0.03 (-0.05, 0.12)	0.61
Alcohol (g/d)	8.6 ± 14.5	9.2 ± 15.0	7.4 ± 12.9	-1.40 (-1.86, -0.95)	-1.40 (-1.92, -0.89)	-0.88 (-1.31, -0.45)	-0.52 (-1.28, 0.24)	0.27	-0.52 (-1.33, 0.29)	0.34