

Diet & Heart failure

30th September 2016

สมเกียรติ แสงวัฒนาโรจน์ พบ.

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อาหารชนชาติใด ดีกับหัวใจและหลอดเลือด ?

อาหาร希臘โบราณ: อาหารเมดิเตอร์เรเนียน
Mediterranean food

Mediterranean diet post MI

de Lorgeril M. Lancet 1994;343:1454-9.

- Prospective randomised single-blinded Post MI 2^{ry} prevention trial, compared Mediterranean diet (n=302) and control diet (n=303), FU 8 wks later & each yr for 5 yrs.
- 1ry outcome: cardiac death and/ or non-fatal MI

Mediterranean diet post MI

de Lorgeril M. Lancet 1994;343:1454-9.

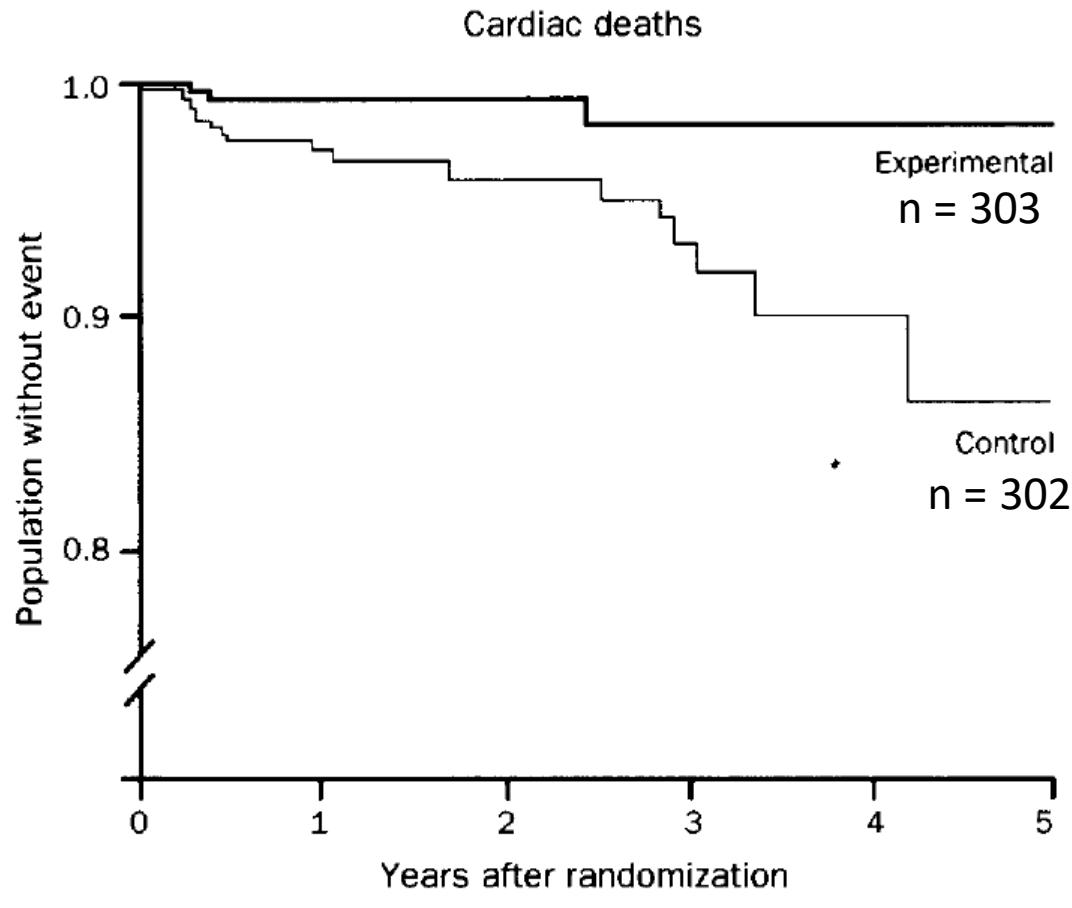


Figure 1: Survival curves for cardiac death, including 1 heart transplant and 1 cardiomyoplasty

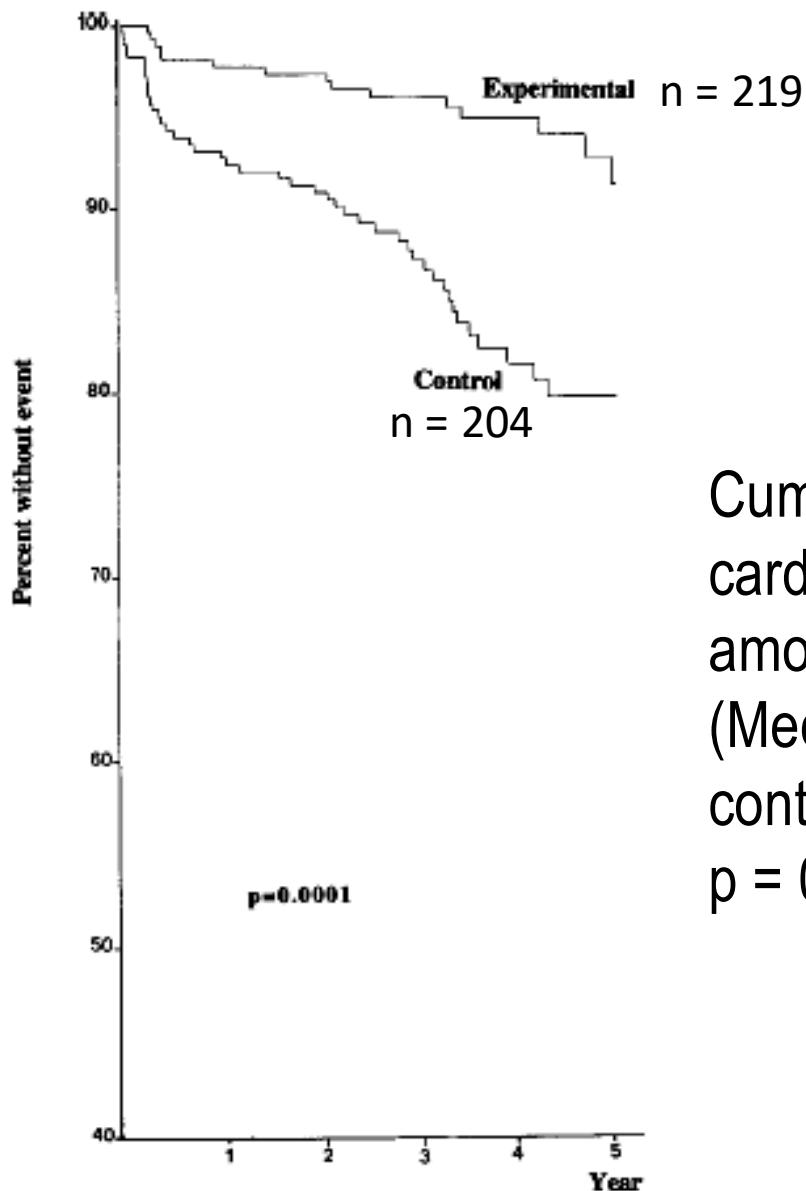
Lyon Diet Heart Study: Mediterranean diet post MI

de Lorgeril M. Circulation. 1999;99:779-785.

- Consecutive pts: <60 yr, 1st AMI survivors, Mar 1988 -Mar 1992, randomized 2 months later: control (AHA step 1 diet) or Mediterranean-type diet
- Patients and their families were seen by the dietitian at the randomization visit, 2 months later, and then once a year.

Lyon Diet Heart Study: Mediterranean diet post MI

de Lorgeril M. Circulation. 1999;99:779-785.



Cumulative survival without
cardiac death & nonfatal MI
among experimental
(Mediterranean group) pts &
control subjects
 $p = 0.0001$

Hurst's the Heart

Chapter 51. Preventive strategies for CHD. Maron DJ.Ridker PM.

- *The magnitude of benefit in the Lyon Diet Heart Study was greater than that shown in any trial of lipid-lowering drugs.*

Primary Prevention of Cardiovascular Disease with a Mediterranean Diet

N Engl J Med 2013.

Ramón Estruch, M.D., Ph.D., Emilio Ros, M.D., Ph.D., Jordi Salas-Salvadó, M.D., Ph.D., DOI: 10.1056/NEJMoa1200303

- Multicenter trial in Spain, randomly assigned participants at high CV risk, but with no CVD :
 1. Mediterranean diet supplemented with extra-virgin olive oil,
 2. Mediterranean diet supplemented with mixed nuts,
 3. Control (reduce dietary fat).
- 1^{ry} end point: rate of major CV events (MI, stroke, or CV death). An interim analysis, trial was stopped after a median follow-up of 4.8 years.
- A total of 7447 persons (age 55-80 yrs); 57% were women. two Mediterranean-diet groups had good adherence to the intervention, self-reported intake and biomarker analyses. A primary end-point event occurred in 288 participants.

Primary Prevention of Cardiovascular Disease with a Mediterranean Diet

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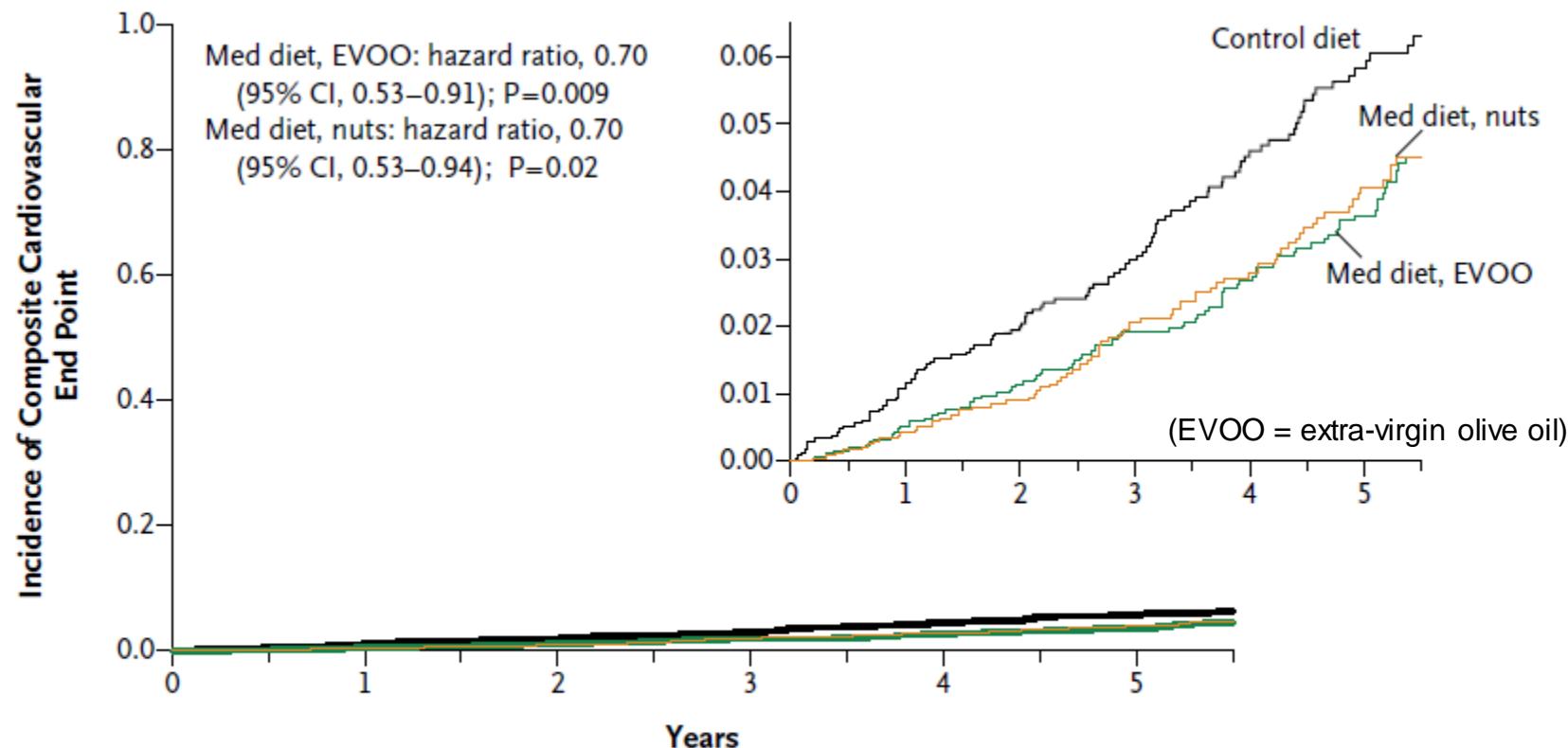
End Point	Mediterranean Diet with EVOO (N=2543)	Mediterranean Diet with Nuts (N=2454)	Control Diet (N=2450)	P Value†	
	Mediterranean Diet with EVOO vs. Control Diet	Mediterranean Diet with Nuts vs. Control Diet			
Person-yr of follow-up	11,852	10,365	9763		
Hazard ratio for each Mediterranean diet vs. control (95% CI)					
Primary end point					
Unadjusted	0.70 (0.53–0.91)	0.70 (0.53–0.94)	1.00 (ref)	0.009	0.02
Multivariable-adjusted 1§	0.69 (0.53–0.91)	0.72 (0.54–0.97)	1.00 (ref)	0.008	0.03
Multivariable-adjusted 2¶	0.70 (0.54–0.92)	0.72 (0.54–0.96)	1.00 (ref)	0.01	0.03
Secondary end points					
Stroke	0.67 (0.46–0.98)	0.54 (0.35–0.84)	1.00 (ref)	0.04	0.006
Myocardial infarction	0.80 (0.51–1.26)	0.74 (0.46–1.19)	1.00 (ref)	0.34	0.22
Death from cardiovascular causes	0.69 (0.41–1.16)	1.01 (0.61–1.66)	1.00 (ref)	0.17	0.98
Death from any cause	0.82 (0.64–1.07)	0.97 (0.74–1.26)	1.00 (ref)	0.15	0.82

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A Primary End Point (acute myocardial infarction, stroke, or death from cardiovascular causes)



No. at Risk

	0	1	2	3	4	5
Control diet	2450	2268	2020	1583	1268	946
Med diet, EVOO	2543	2486	2320	1987	1687	1310
Med diet, nuts	2454	2343	2093	1657	1389	1031

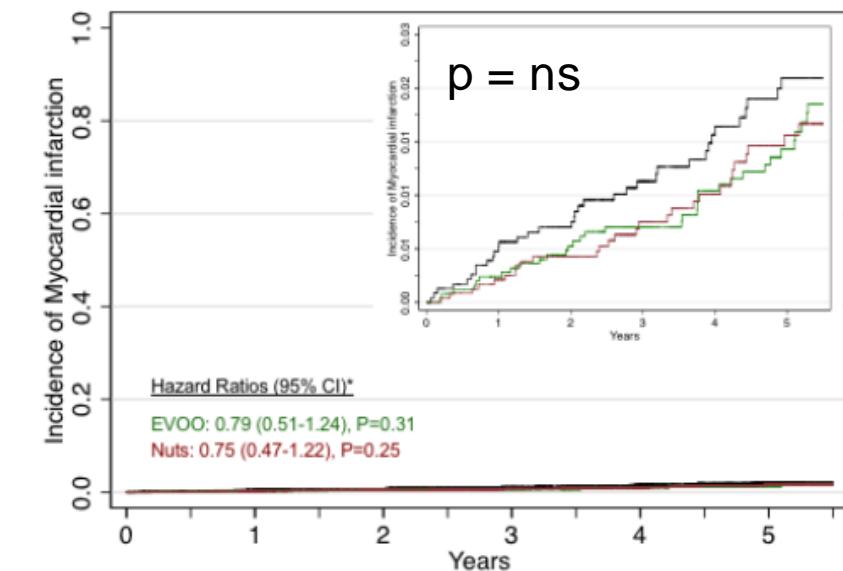
Primary Prevention of Cardiovascular Disease with a Mediterranean Diet

N Engl J Med 2013.

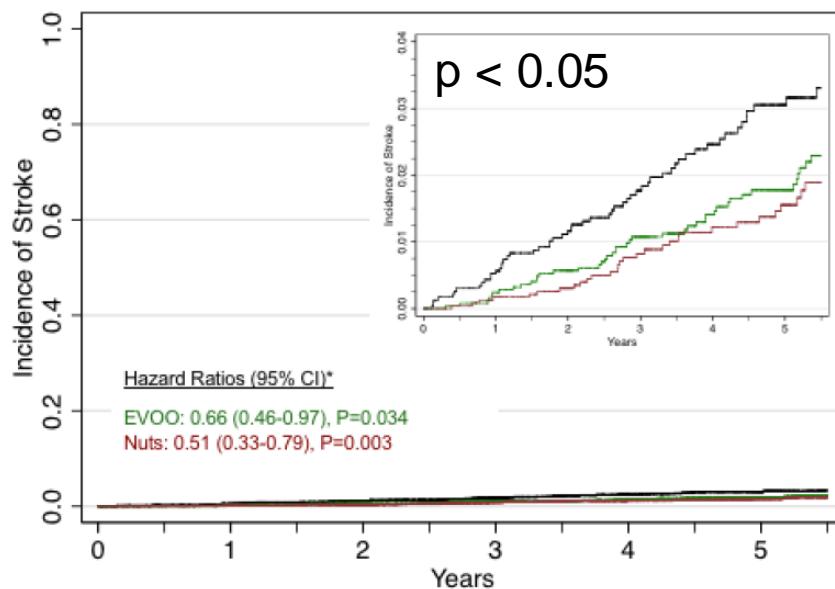
Ramón Estruch, M.D., Ph.D., Emilio Ros, M.D., Ph.D., Jordi Salas-Salvadó, M.D., Ph.D.,

DOI: 10.1056/NEJMoa1200303

A) Myocardial Infarction



B) Stroke



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

Number at risk

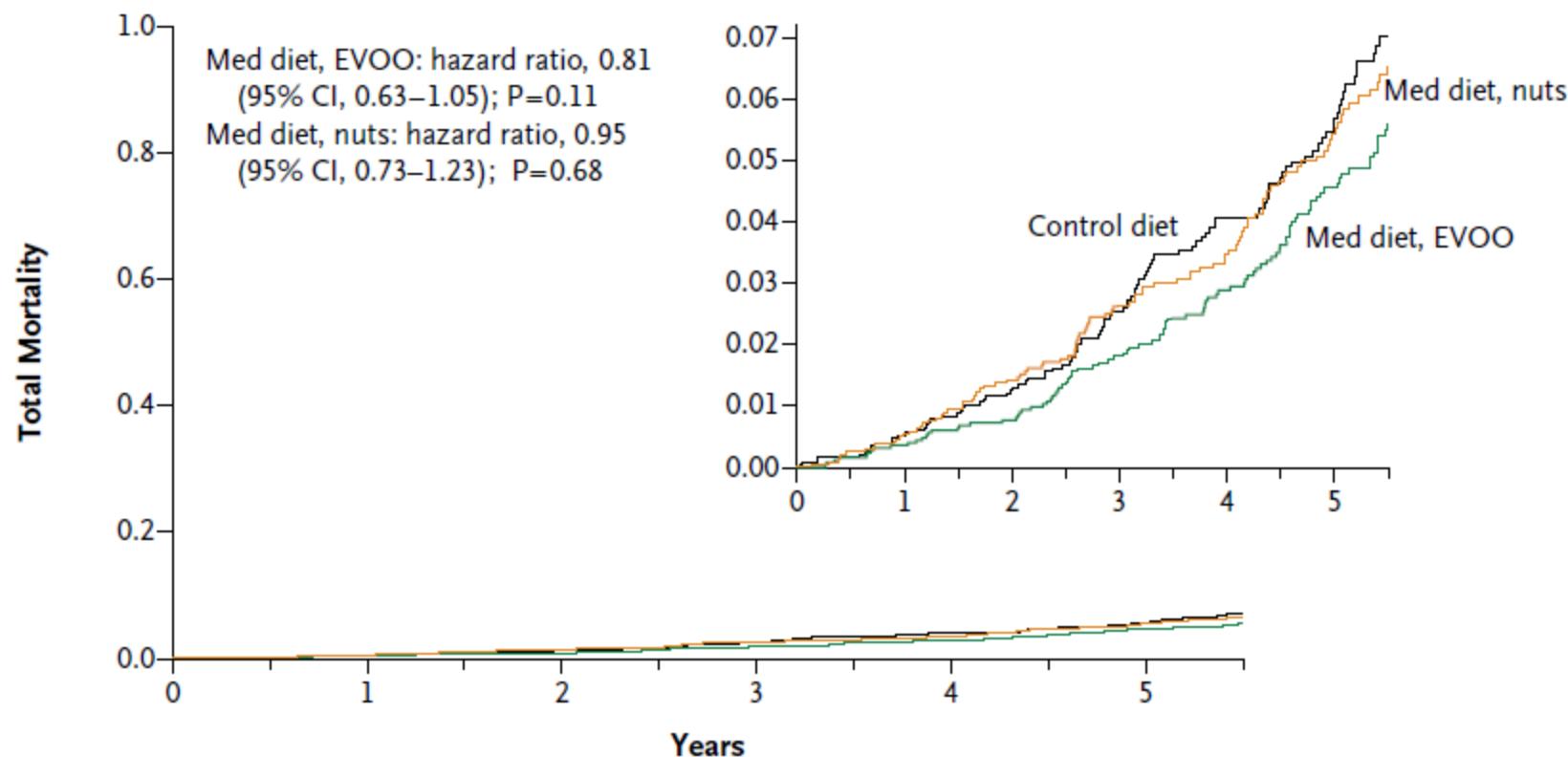
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Primary Prevention of Cardiovascular Disease with a Mediterranean Diet

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B Total Mortality



No. at Risk

	0	1	2	3	4	5
Control diet	2450	2268	2026	1585	1272	948
Med diet, EVOO	2543	2485	2322	1988	1690	1308
Med diet, nuts	2454	2345	2097	1662	1395	1037

อาหารชาวกรีกโบราณ

Meta-analysis. Sofi F. BMJ 2008;337:a1344
doi:10.1136/bmj.a1344

อาหารเมดิเตอเรเนียนดั้งเดิม

อาหารเมดิเตอเรเนียน ๙ ประเภท

1. เนื้อแดง / ปูรุ่งแต่ง น้ำ油มาก ๆ
2. ของหวาน นม เนย ไข่ และผลิตภัณฑ์สัตว์น้ำ油

3. แอลกอฮอล ปานกลาง

4. ถั่ว มาก

5. หัวพืช ไม่ปูรุ่งแต่ง ไม่ขัดขวางมาก

6. ผลไม้ หัวพืช เม็ดเปลือกแข็ง มาก

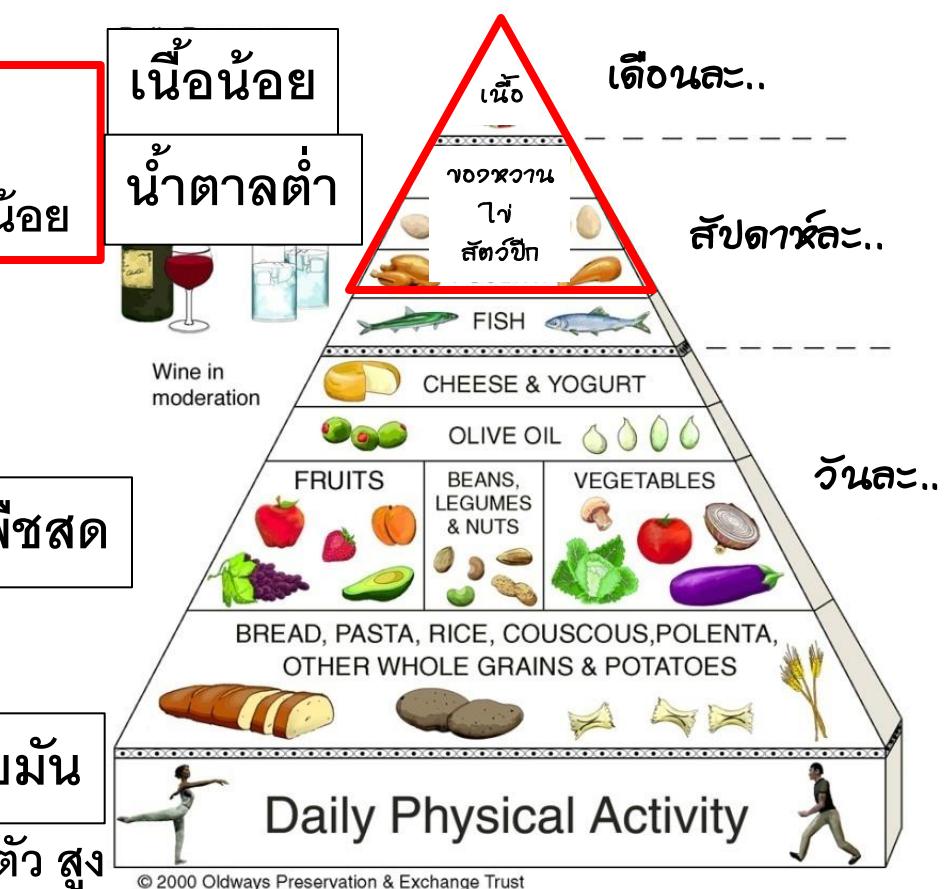
7. ผัก มาก

8. ปลา ๒-๓ มื้อต่อสัปดาห์

9. กรดไขมันไม่อิมตัวตำแหน่งเดียว: ไขมันอิมตัว สูง

พืชสด

ด้วยมัน



อาหารกรีกโบราณทุก ๆ ๒ ประภากินเพิ่มขึ้น ลดโอกาสตายจากทุกสาเหตุ ๕%

Mediterranean diet & mortality

Meta-analysis. Sofi F. BMJ 2008;337:a1344

doi:10.1136/bmj.a1344

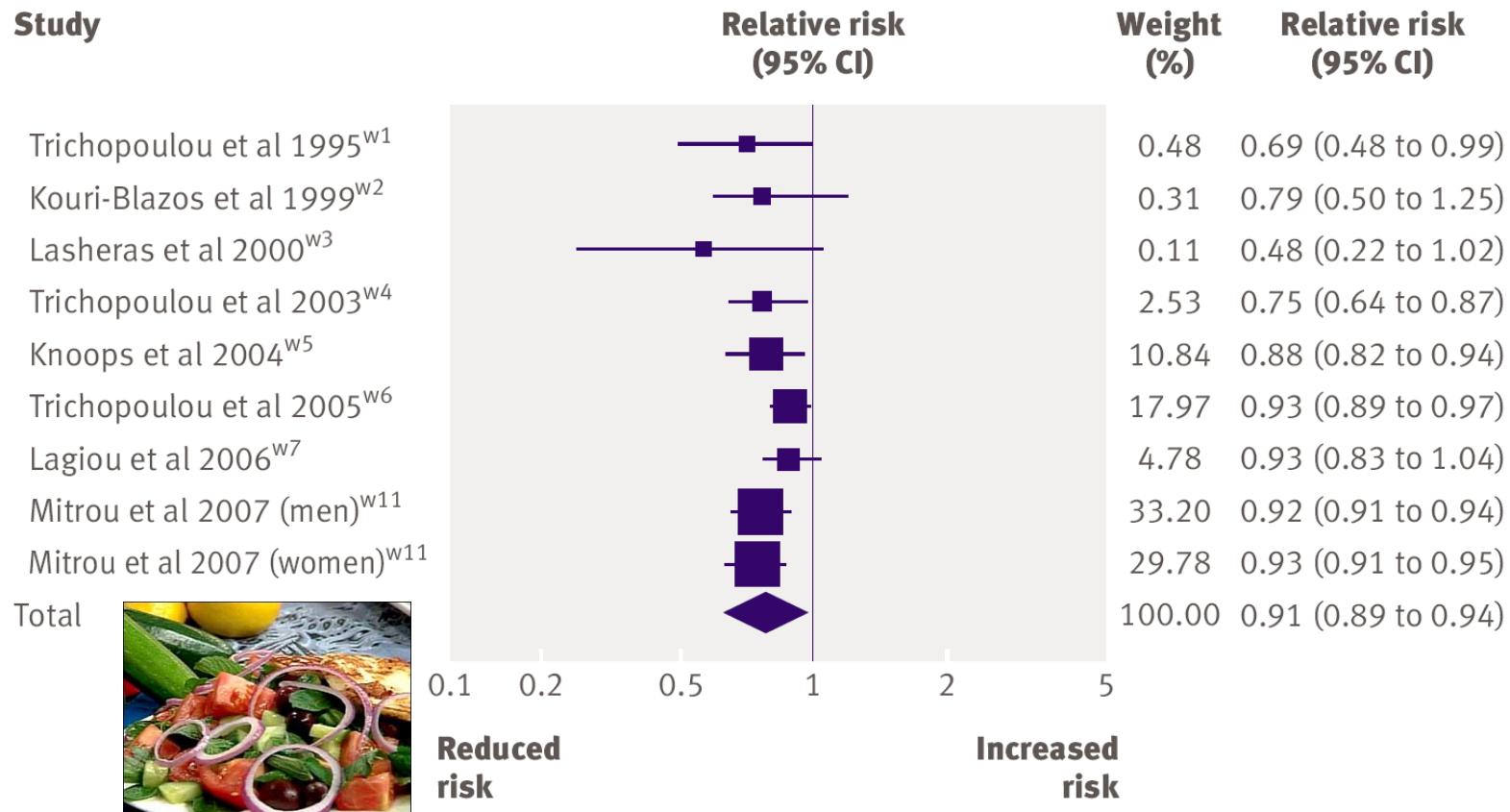


Fig 2 | Risk of all cause mortality associated with two point increase in adherence score for Mediterranean diet. Squares represent effect size; extended lines show 95% confidence intervals; diamond represents total effect size

อาหารกรีกโบราณทุก ๒ ประเภทกินเพิ่มขึ้น ลดโอกาสตายจากโรคหัวใจหลอดเลือด ๕%

Mediterranean diet & CV mortality

Meta-analysis. Sofi F. BMJ 2008;337:a1344

doi:10.1136/bmj.a1344

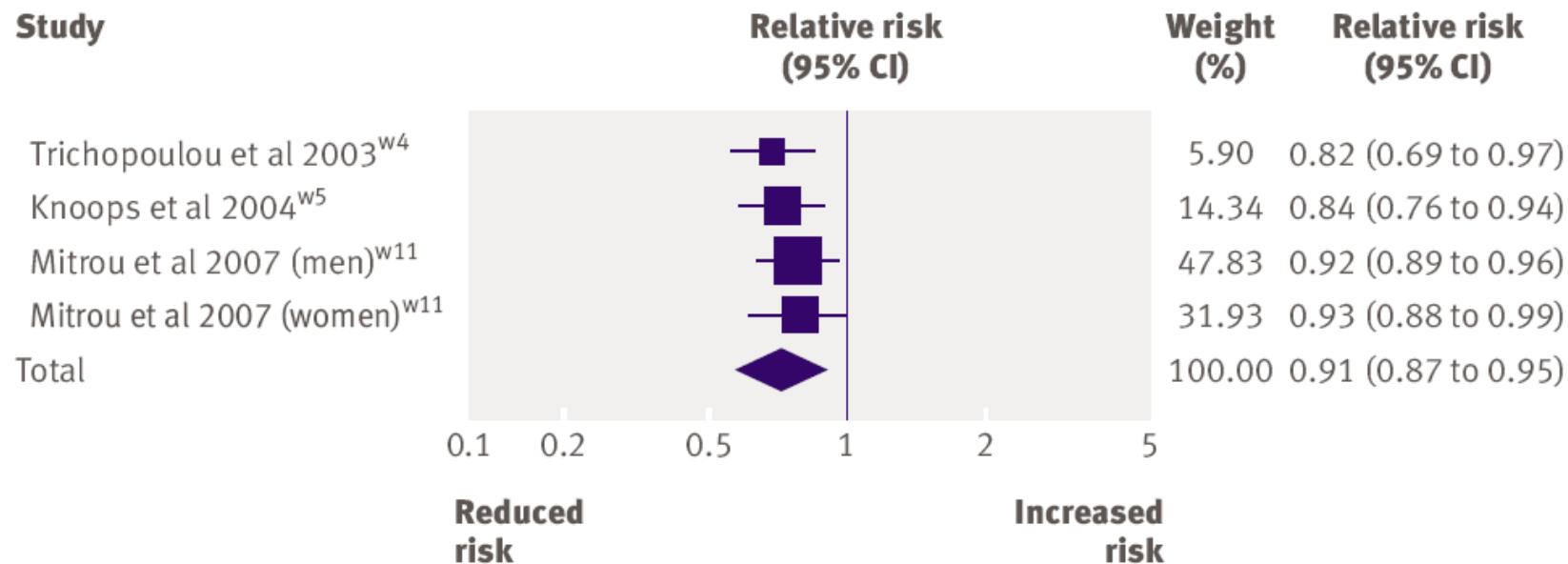


Fig 3 | Risk of mortality from cardiovascular diseases associated with two point increase in adherence score for Mediterranean diet. Squares represent effect size; extended lines show 95% confidence intervals; diamond represents total effect size



อาหารกรีกโบราณทุก ๆ ๒ ประภากินเพิ่มขึ้น ลดโอกาสตายจากมะเร็ง ๖%

Mediterranean diet & CA mortality

Meta-analysis. Sofi F. BMJ 2008;337:a1344
doi:10.1136/bmj.a1344

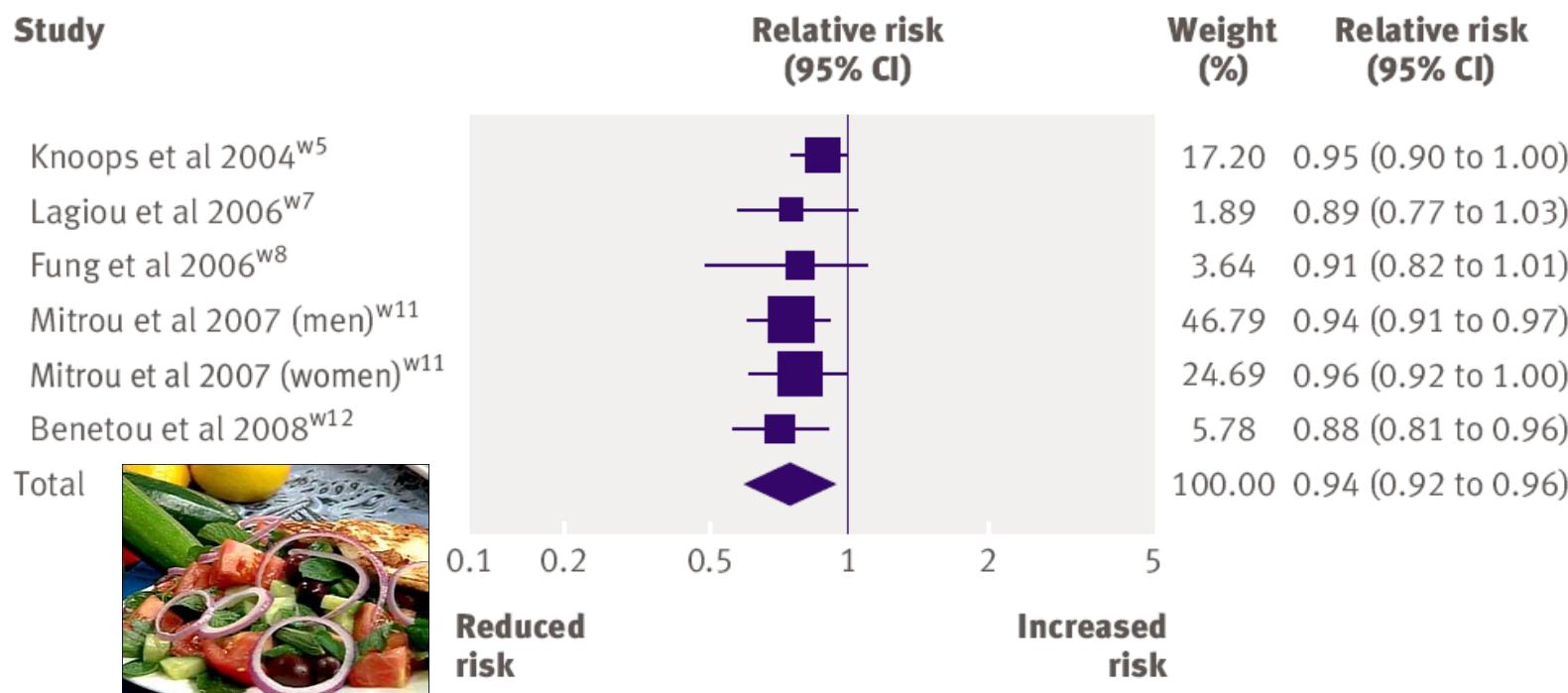


Fig 4 | Risk of occurrence of or mortality from cancer associated with two point increase in adherence score for Mediterranean diet. Squares represent effect size; extended lines show 95% confidence intervals; diamond represents total effect size

อาหารกรีกโบราณทุก ๆ ๒ ประภากินเพิ่ม ลดโอกาสโรคพาร์กินสัน และ อัลไซเมอร์ ๑๓ %

Mediterranean diet & Parkinson & Alzheimer's disease

Meta-analysis. Sofi F. BMJ 2008;337:a1344. doi:10.1136/bmj.a1344

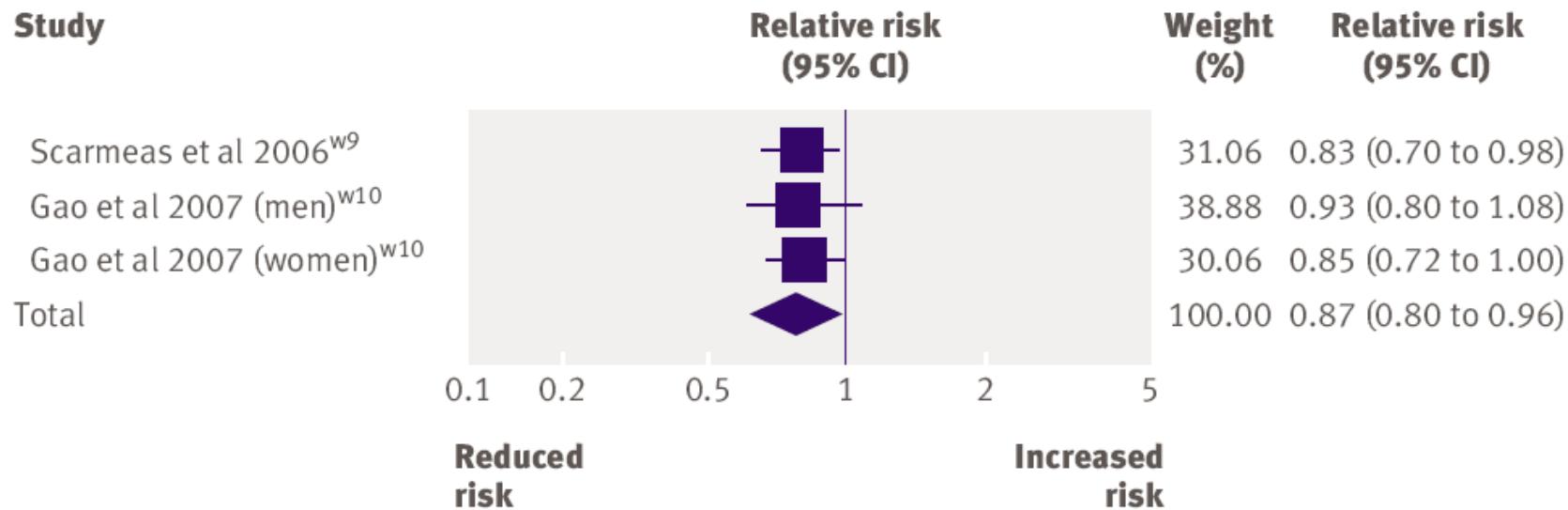


Fig 5 | Risk of Parkinson's disease and Alzheimer's disease associated with two point increase in adherence score for Mediterranean diet. Squares represent effect size; extended lines show 95% confidence intervals; diamond represents total effect size



อาหารกริ๊บแบบดั้งเดิม



Wine in moderation
and respecting social beliefs



Regular physical activity
Adequate rest
Conviviality

2010 edition

Biodiversity and seasonality
Traditional, local
and eco-friendly products
Culinary activities

s = Serving

คนไทยจะกินอย่างไร ?



Fundación
Dieta Mediterránea

ICAF

International Commission on the
Anthropology of Food and Nutrition



Mediterranean diet & HF

A Mediterranean-style diet, its components and the risk of heart failure: a prospective population-based study in a non-Mediterranean country

J Wirth European Journal of Clinical Nutrition (2016) 70, 1015–1021

- 24 008 middle-aged participants of the European Prospective Investigation into Cancer and Nutrition (EPIC)-Potsdam (Germany), including 209 incident HF cases within 8.2 years. The traditional Greek Mediterranean diet score (tMED) was used to assess dietary adherence. Cox's proportional hazards regression was applied to estimate the relationship between the adherence to the Mediterranean-style diet, its components and HF risk.

A Mediterranean-style diet, its components and the risk of heart failure: a prospective population-based study in a non-Mediterranean country

J Wirth European Journal of Clinical Nutrition (2016) 70, 1015–1021

Table 1. Median dietary intakes of Mediterranean diet score components for men and women from EPIC-Potsdam and EPIC-Greece

Component	Men		Women	
	EPIC-P	EPIC-G	EPIC-P	EPIC-G
Fish	23.0	23.7	16.4	18.8
Fruits and nuts	97.0	362.5	133.8	356.3
Vegetables	81.3	549.9	96.9	499.6
Legumes	23.2	9.1	14.5	6.7
MUFA/SFA ratio	0.9	1.7	0.8	1.7
Cereals	223.2	177.7	173.2	139.7
Meat products	136.0	120.8	87.0	89.8
Milk products	152.9	196.7	189.9	191.1

Table 3. Association between the adherence to the Mediterranean diet

one point was assigned for intakes at or above the sex-specific median intakes of the Greek population (Table 1) for components considered to conform to the

Mediterranean diet (vegetables, fruits/nuts, legumes, cereals, fish and monounsaturated/saturated fat). Persons who consumed less received no point. For meat and milk products, the scoring was reversed. Regarding alcohol, a value of one was assigned for moderate consumption (men: $\geq 10\text{--}50\text{ g/day}$, women: $\geq 5\text{--}25\text{ g/day}$) and zero for lower/higher intakes.

Thus, the tMED included nine components, with a possible range from 0 to 9 points (min. to max.)

	tMED (points)				
	0–2		3–4		5–7
	n (cases)	HR	HR (95% CI)	HR (95% CI)	P _{trend}
n (cases)	4272 (38)		15 197 (142)	4539 (29)	24 008 (209)
Person-years	35 310		125 266	37 458	per two units
	HR	HR (95% CI)	HR (95% CI)	P _{trend}	HR (95% CI)
Model 1	1	0.95 (0.67–1.37)	0.59 (0.36–0.96)	0.03	0.76 (0.60–0.97)
Model 2	1	0.99 (0.69–1.41)	0.63 (0.39–1.02)	0.06	0.80 (0.62–1.02)
Model 3	1	1.00 (0.70–1.43)	0.66 (0.41–1.08)	0.10	0.82 (0.64–1.05)

A Mediterranean-style diet, its components and the risk of heart failure: a prospective population-based study in a non-Mediterranean country

J Wirth European Journal of Clinical Nutrition (2016) 70, 1015–1021

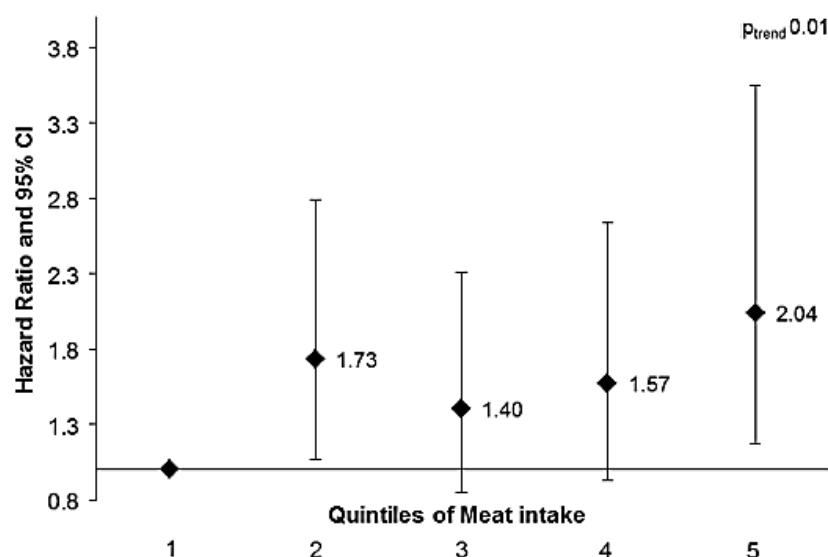


Figure 3. Associations between meat consumption and HF risk. HRs

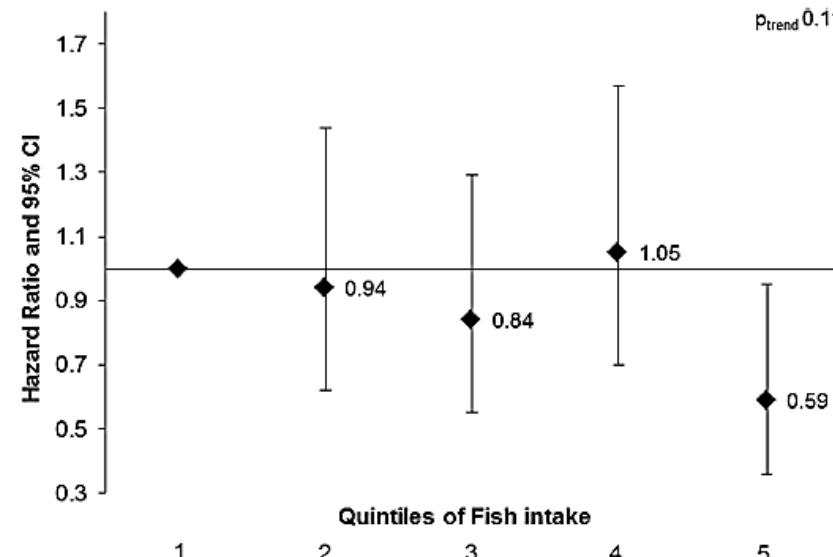


Figure 2. Associations between fish consumption and HF risk. HRs

2015-2016 Mediterranean Diet Cohorts & Health

2015-2016 Prospective Cohorts on Mediterranean Diet & Health(n=19). Martinez MA. Curr Opin Clin Nutr Metab Care 2016

Table 1. Main observational prospective studies published in 2015 and during January–May 2016 on health effects of the Mediterranean diet

Author, year (Reference)	Study	Location	Outcome (s)	Exposure	n	Follow-up	Results/observations
Panagiotakos, 2015 [6]	ATTICA	Greece	CVD	MedDiet and lifestyles	2583	10 years	MedDiet associated with lower risk of CVD (RR, 0.98, 0.95–1.01), for each additional unit in a 0–55 score, equivalent to a HR, 0.78, 0.53–1.13 for two units in a 0–9 score
Panagiotakos, 2015 [7]	ATTICA	Greece	CVD	MedDiet and mediators	2583	10 years	MedDiet associated with lower risk of CVD (RR, 0.96, 0.93–1.00), for each additional unit in a 0–55 score, equivalent to a HR, 0.60, 0.41–1.00 for two units in a 0–9 score
Sotos-Prieto, 2015 [8*]	HPFUS NHS	The United States	CVD	Several food patterns	80538	17.3 years	Improving adherence to MedDiet during the first 4 years of follow-up associated with a lower risk of CVD, HR, 0.91 (0.86–0.97)
Harmon, 2015 [9*]	Multiethnic cohort	The United States	Mortality	Several food patterns	215782	15.5 years	MedDiet inversely associated with mortality both in men HR, 0.76 (0.73, 0.80) and in women HR, 0.78 (0.74, 0.82) for the fifth vs. first quintile
Tektonidis, 2015 [10*]	SMC	Sweden	MI, HF stroke, HF	MedDiet	32921	10 years	MedDiet associated with lower risk of MI (RR, 0.74, 0.61–0.90), HF (RR, 0.79, 0.68–0.93), and ischemic stroke (RR: 0.78, 0.65–0.93), but not hemorrhagic stroke (RR: 0.88, 0.61–1.29)

2015-2016 Prospective Cohorts on Mediterranean Diet & Health(n=19). Martinez MA. Curr Opin Clin Nutr Metab Care 2016

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Author, year (Reference)	Study	Location	Outcome (s)	Exposure	n	Follow-up	Results/observations
Tektonidis, 2016 [11*]	COSM	Sweden	HF	MedDiet	37308	10.9 years	Inverse association of the MedDiet with heart failure HR, 0.85 (0.78–0.91) for each two additional points in a 0–8 score
Bellavia, 2016 [12] MedDiet inversely associated with total mortality, HR, 0.81, 0.75–0.86 for high versus low adherence	COSM + SMC	Sweden	Mortality	MedDiet	71 333		15 years
Fransen, 2015 [13]	EPIC-NL	The Netherlands	QALYs	Several food patterns	33 066	12.4 years	MedDiet associated with a 2-month increase in QALYs (0.6–3.6 months)
May, 2015 [14]	EPIC-NL	The Netherlands	DALYs	MedDiet and lifestyles	33 066	12.4 years	MedDiet associated with reduced DALYs –0.24 (–0.44 to –0.02)
Menotti, 2016 [15]	Italian rural areas of Seven Countries	Italy	Mortality	MedDiet and lifestyles	1712	50 years	Inverse association of the MedDiet with all-cause mortality HR, 0.67 (0.57–0.78), CV mortality HR, 0.68 (0.54–0.86), and cancer mortality 0.54 (0.40–0.73). Life expectancy was 4.4 years longer for MedDiet

2015-2016 Prospective Cohorts on Mediterranean Diet & Health(n=19). Martinez MA. Curr Opin Clin Nutr Metab Care 2016

Author, year (Reference)	Study	Location	Outcome (s)	Exposure	n	Follow-up	Results/observations
Prinelli, 2015 [16]	Lombardy cohort	Italy	Mortality	MedDiet	974	17.4 years	Inverse association of the MedDiet with mortality HR, 0.62 (0.43–0.89) for high versus low adherence
Bonaccio, 2016 [17]	Moli-Sani	Italy	Mortality	MedDiet	1995	4 years	In diabetic patients, MedDiet was inversely associated with mortality HR, 0.63 (0.49–0.81) for each two additional points in a 0–9 score
Bo, 2016 [18]	Turin study	Italy	Mortality, CVD	MedDiet	1658	12 years	High adherence to MedDiet inversely associated with all-cause mortality (HR, 0.83, 0.72–0.96), and CVD (HR, 0.79, 0.65–0.97). No association with mortality among high-risk patients
Stefler, 2015 [19]	HAPIEE	Czech Republic, Poland, Russia	Mortality, CVD	MedDiet	19 333	7 years	One SD in MedDiet adherence inversely associated with all-cause death (HR, 95% CI 0.93, 0.88–0.98) and CVD (0.90, 0.81–0.99)
Hernandez-Hernandez, 2015 [20]	SUN cohort	Spain	CVD	MADP	14 651	9.7 years	No significant association between the departure from the MADP and CVD, HR, 1.55 (0.58–4.16)

MADP = Mediterranean Alcohol Drinking Patt

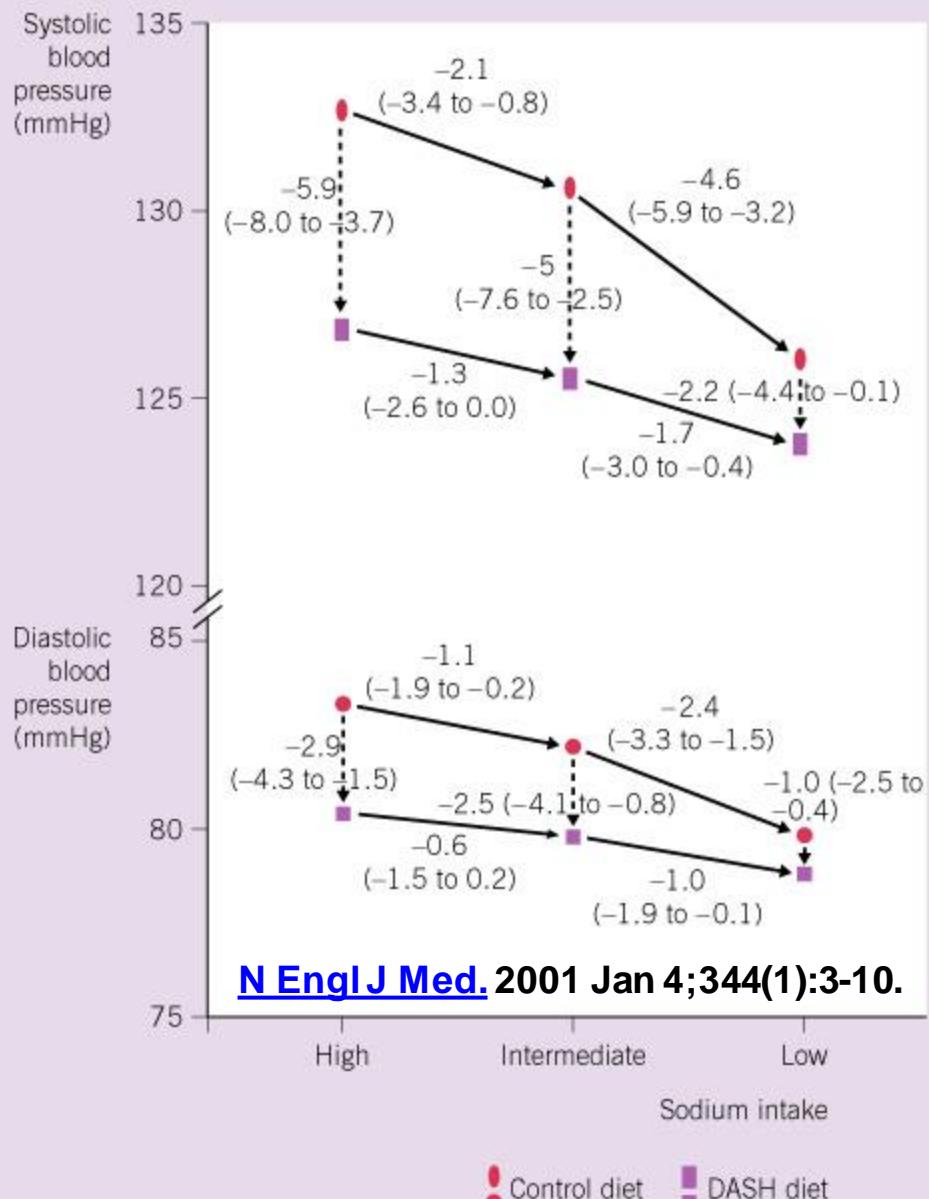
2015-2016 Prospective Cohorts on Mediterranean Diet & Health(n=19). Martinez MA. Curr Opin Clin Nutr Metab Care 2016

Author, year (Reference)	Study	Location	Outcome (s)	Exposure	n	Follow-up	Results/observations
Martinez-Gonzalez, 2015 [21]	PREDIMED	Spain	Mortality, CVD	Empirically derived food patterns	7216	4.3 years	MedDiet (empirically identified) associated with lower risk of CV, HR fourth vs. first quartile, 0.52 (0.36–0.74) and all-cause mortality, HR, 0.53 (0.38–0.75)
Pérez-Tasigchana, 2015 [22]	UAM cohort + Seniors ENRICA cohort	Spain	Quality of life	MedDiet	4287	2.5 years	MedDiet associated with better physical quality of life, +1.34 (+0.21 to +2.47) for third vs. first tertile but no association with mental quality of life according to SF-12
Stewart, 2016 [23 ^a]	STABILITY (patients with stable CHD)	39 countries	CVD	MedDiet	15 482	3.7 years	MedDiet associated with lower CVD HR, 0.95 (0.91–0.98), for each additional unit in a 0–24 score, equivalent to a HR, 0.76, 0.61–0.90 for two units in a 0–9 score, but only if more than 12 points in the 0–24 score
Lau, 2015 [24]	Patients with stable CHD	Hong Kong	BP variability stroke	MedDiet	274	77 months	Lower variability in BP, lower SBP and lower incidence of stroke, HR, 0.48 (0.24–0.94) associated with better adherence to MedDiet

Dietary Approaches to Stop Hypertension diet

N Engl J Med 1997;336:1117-24

EFFECT ON SYSTOLIC AND DIASTOLIC BLOOD PRESSURE
OF REDUCED SODIUM INTAKE AND THE DASH DIET



[N Engl J Med. 2001 Jan 4;344\(1\):3-10.](#)

DASH diet lower Heart Failure rate

Levitian EB. Arch Intern Med 2009;169:851-7.

- Prospective observation in 36,019 women in Swedish Mammography Cohort, 48 - 83 yrs \hat{s} baseline HF, DM, or MI.
- Food-frequency questionnaires, A score ranking intake of DASH diet components & 3 additional scores based on food and nutrient guidelines.
- Cox proportional hazards models: rate ratios of HF-assoc hospitalization or death (Jan 1, 1998 to Dec 31, 2004)
- **During 7 yrs, 443 ♀ developed HF (28 HF deaths)**

DASH diet lower Heart Failure rate

Levitian EB. Arch Intern Med 2009;169:851-7.

- DASH diet component score: ranked on intake of
 - Fruits,
 - Vegetables,
 - Nuts and legumes,
 - Whole grains,
 - Low-fat dairy products,
 - Scores were summed overall score. (Max. = 40)
- พิชสด } Highest = 5, lowest = 1
- ด้อຍมัน }
ลดเกลือ }
น้ำตาลตា }
เนื้อน้อย } Highest = 1, lowest = 5

อาหารลดความดันฯ ลดหัวใจล้มเหลว ๓๗%

Levitan EB. Arch Intern Med 2009;169:851-7.

Table 3. Association of DASH Scores With Incident Heart Failure

Variable	DASH Diet Score				P Value ^a
	Quartile 1	Quartile 2	Quartile 3	Quartile 4	
DASH diet component score					
Range	9-22	23-24	25-27	28-39	
No. of cases	162	87	105	89	
Person-years	68 296	44 213	66 395	66 231	
Model 1 RR (95% CI) ^b	1 [Reference]	0.81 (0.63-1.06)	0.67 (0.53-0.86)	0.59 (0.46-0.77)	<.001
Model 2 RR (95% CI) ^c	1 [Reference]	0.85 (0.66-1.11)	0.69 (0.54-0.88)	0.63 (0.48-0.81)	<.001

RR = rate ratio

^a P for linear trend.

^b Model 1: Cox proportional hazards models with baseline hazard allowed to vary by age.

^c Model 2: Model 1 additionally adjusted for physical activity (linear), energy intake (linear), education status (<high school, high school, or university), family history of myocardial infarction at age younger than 60 years (yes or no), cigarette smoking (current, past, or never), living alone (yes or no), postmenopausal hormone use (yes or no), self-reported history of hypertension and high cholesterol concentration, body mass index (linear), and incident myocardial infarction (time varying: no myocardial infarction, myocardial infarction in the previous year, or myocardial infarction >1 year previously).

อาหารลดความดันฯ ลดหัวใจล้มเหลว ๓๗%

Levitan EB. Arch Intern Med 2009;169:851-7.

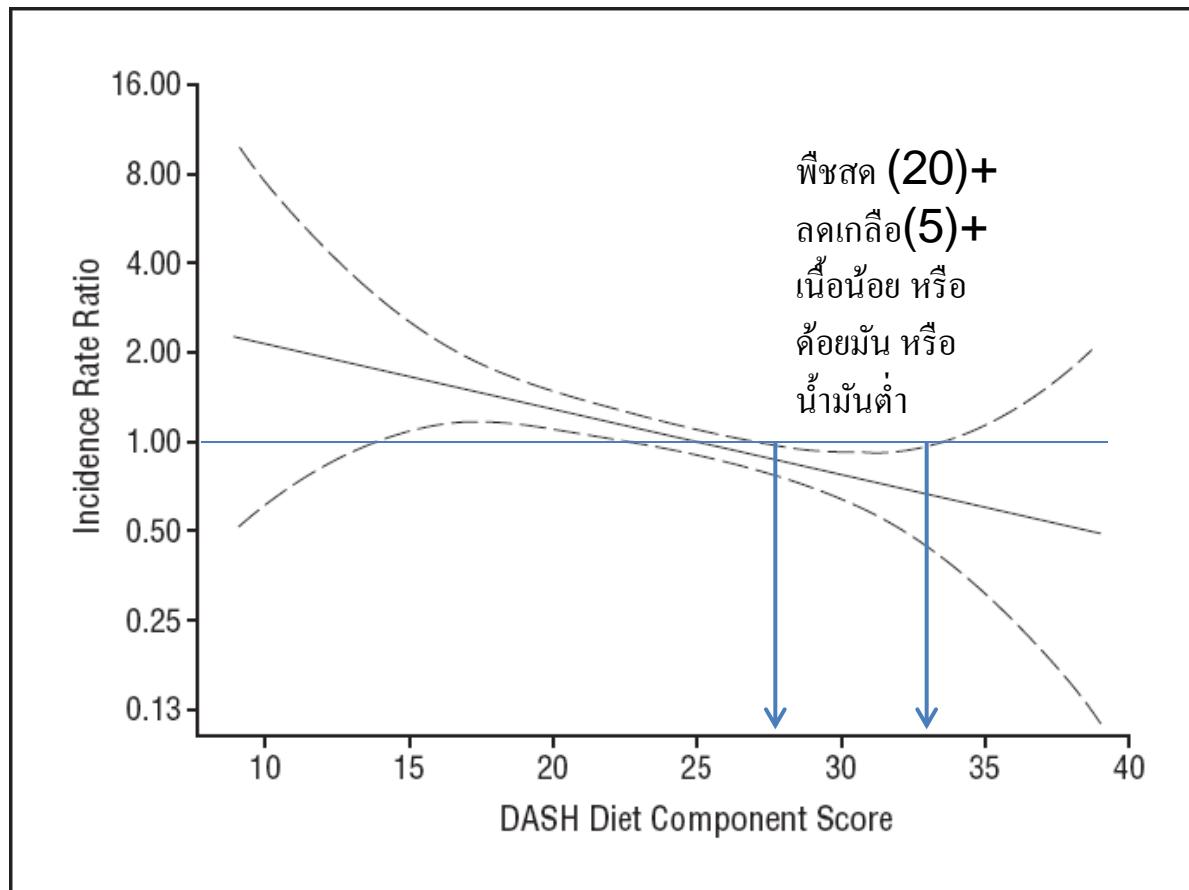


Figure 1. Rate of heart failure. The solid line represents the incidence rate ratio of heart failure, and dashed lines represent 95% confidence intervals. Penalized cubic splines with 3 *df* were used to flexibly model the shape of the association. Cox proportional hazards models that enable the baseline hazard to vary by age and adjusted for physical activity (linear), energy intake (linear),

Med vs. DASH diets & death in HF.

Women's Health Initiative.

Levitant EB. DOI: 10.1161/Cir Heart Fail 2013;6:1116-23.113.000495

Table 2. Mediterranean and DASH diet scores and mortality among women with heart failure

	Quartile 1	Quartile 2	Quartile 3	Quartile 4	p-trend
<i>Mediterranean diet score</i>					
N	572	1,305	589	749	
Median (Range)	2 (0-2)	4 (3-4)	5 (5-5)	6 (6-9)	
Deaths	260	587	248	290	
Person-years	2,582	5,772	2,741	3,639	
Mortality rate per 100 person-years	10.1	10.2	9.0	8.0	
Model 1 HR (95% CI) [*]	1	1.00 (0.86-1.17)	0.88 (0.74-1.04)	0.75 (0.63-0.89)	<0.001
Model 2 HR (95% CI) [†]	1	1.09 (0.93-1.28)	1.02 (0.85-1.22)	0.91 (0.75-1.09)	0.29
Model 3 HR (95% CI) [‡]	1	1.05 (0.89-1.24)	0.97 (0.81-1.17)	0.85 (0.70-1.02)	0.08
<i>DASH diet score</i>					
N	768	704	956	787	
Median (Range)	19 (9-21)	23 (22-24)	26 (25-28)	31 (29-40)	
Deaths	345	329	386	325	
Person-years	3,440	3,120	4,477	3,698	
Mortality rate per 100 person-years	10.0	10.5	8.6	8.8	
Model 1 HR (95% CI) [*]	1	1.00 (0.85-1.16)	0.77 (0.66-0.90)	0.75 (0.64-0.89)	<0.001
Model 2 HR (95% CI) [†]	1	1.05 (0.90-1.23)	0.86 (0.73-1.02)	0.89 (0.75-1.05)	0.07
Model 3 HR (95% CI) [‡]	1	1.04 (0.89-1.21)	0.83 (0.70-0.98)	0.84 (0.70-1.00)	0.01



JOURNAL OF THE AMERICAN HEART ASSOCIATION

Vegetables, nuts, whole grains ↓ death in HF.

Women's Health Initiative.

Levitian EB. DOI: 10.1161/Cir Heart Fail 2013;6:1116-23.113.000495

Table 3. Components of the Mediterranean and DASH diet scores and mortality among women with heart failure*

	Quartile 1	Quartile 2	Quartile 3	Quartile 4	p-trend
<i>Mediterranean diet score</i>					
Fruits	1	1.06 (0.89-1.25)	1.06 (0.90-1.26)	1.05 (0.89-1.25)	0.67
Vegetables	1	0.95 (0.81-1.12)	0.97 (0.82-1.14)	0.81 (0.68-0.96)	0.01
Nuts	1	0.97 (0.83-1.14)	0.92 (0.81-1.06)	0.86 (0.74-0.96)	0.049
Legumes	1	1.01 (0.87-1.17)	0.98 (0.85-1.13)	0.95 (0.81-1.12)	0.49
Whole grains	1	0.91 (0.78-1.05)	0.82 (0.70-0.96)	0.79 (0.67-0.94)	0.005
Fish	1	1.00 (0.86-1.17)	1.01 (0.86-1.18)	1.00 (0.85-1.18)	0.98
Ratio of monounsaturated to saturated fat	1	0.91 (0.78-1.06)	1.06 (0.91-1.23)	0.91 (0.78-1.07)	0.51
Red and processed meat	1	0.97 (0.83-1.13)	0.95 (0.81-1.11)	1.13 (0.93-1.36)	0.16
Alcohol	1	1.02 (0.87-1.20)	0.99 (0.85-1.16)	0.94 (0.80-1.10)	0.32
<i>DASH diet score</i>					
Fruits	1	1.06 (0.89-1.25)	1.06 (0.90-1.26)	1.05 (0.89-1.25)	0.67
Vegetables	1	0.95 (0.81-1.12)	0.97 (0.82-1.14)	0.81 (0.68-0.96)	0.01
Nuts and legumes	1	0.87 (0.75-1.01)	0.90 (0.77-1.05)	0.81 (0.69-0.95)	0.03
Low-fat dairy	1	0.81 (0.70-0.95)	0.84 (0.73-0.98)	0.83 (0.71-0.98)	0.11
Whole grains	1	0.91 (0.78-1.05)	0.82 (0.70-0.96)	0.79 (0.67-0.94)	0.005
Sodium	1	0.96 (0.82-1.12)	0.98 (0.84-1.14)	1.09 (0.94-1.28)	0.23
Sweetened beverages†	1	1.00 (0.85-1.18)	0.98 (0.85-1.13)		0.80
Red and processed meat	1	0.97 (0.83-1.13)	0.95 (0.81-1.11)	1.13 (0.93-1.36)	0.16

อาหารลดความดันฯ ลดโรคหัวใจและหลอดเลือดด้วย

614

A. Salehi-Abargouei et al / Nutrition 29 (2013) 611–618

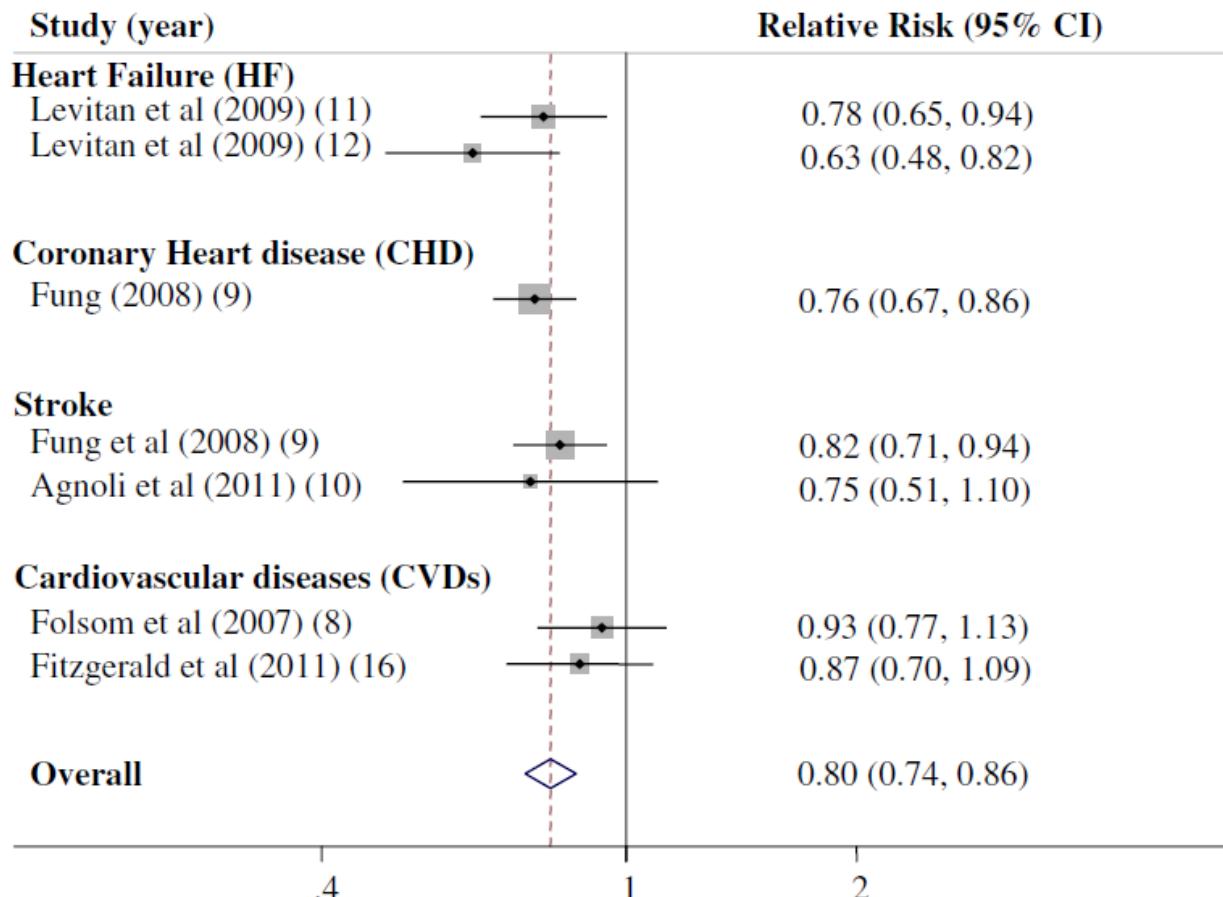


Fig. 1. Forest plot illustrating weighted relative risk (RR) using random effects model for all CVDs, arranged by CVD type, comparing highest with lowest DASH diet concordance ntile.

Salt, sodium & cardiovascular disease

↓Dietary salt 3 g/d (Na 1.2g/d)

Bibbins-Domingo K. N Engl J Med 2010;362:590-9

35–44 yr

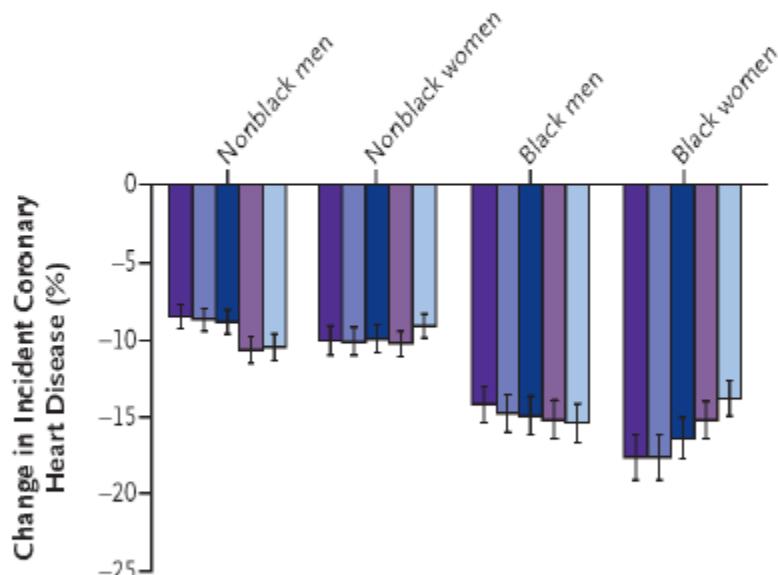
45–54 yr

55–64 yr

65–74 yr

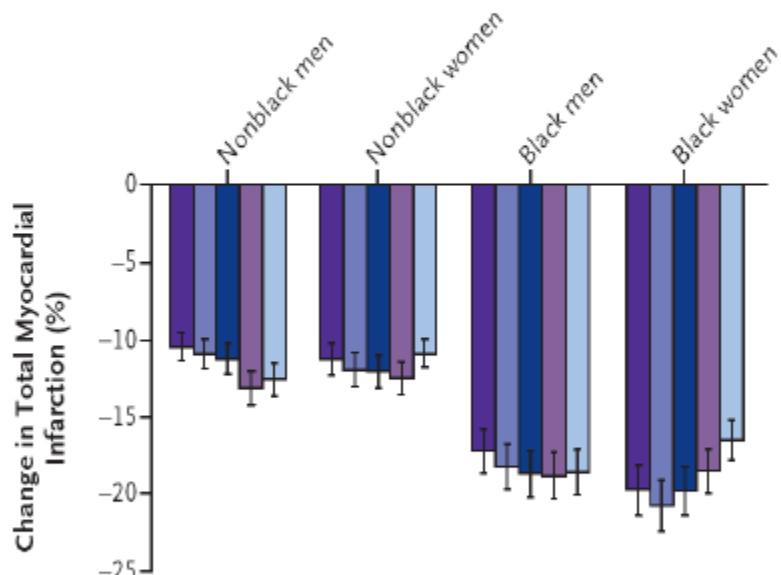
75–84 yr

A



Annual ↓ incident CHD ≈8-18%

B



Annual ↓ total MI ≈10 -20%

Highest estimate for effect of salt reduction on systolic BP

Dietary salt reduction vs. interventions

Bibbins-Domingo K. N Engl J Med 2010;362:590-9

Interventions	CHD incidence	Total death
Salt reduction		
1 g/d	2.0 – 3.3 %	0.9 – 1.4 %
3 g/d	5.9 – 9.6 %	2.6 – 4.1 %
Smoking cessation	3.7 %	4.3 %
Weight loss	5.3 %	2.0 %
Statin Rx 1^{ry} Px	5.3 %	0.3 %
HT Med Rx	9.3 %	4.1 %

Projected estimated of population intervention on
Annual Reduction in CV events (% change from expected)

Meat intake & CV risk

Processed and Unprocessed Red Meat Consumption and Risk of Heart Failure: A Prospective Study of Men

Joanna Kaluza, Agneta Åkesson and Alicja Wolk

Circ Heart Fail. published online June 12, 2014

DOI: 10.1161/CIRCHEARTFAILURE.113.000921

- The population-based prospective Cohort of Swedish Men (COSM) included 37 035 men, aged 45-79 y, with no history of HF, ischemic heart disease, or cancer at baseline. Meat consumption was assessed with a self-administered questionnaire in 1997.
- During a mean follow-up of 11.8 y, 2891 incidences and 266 deaths from HF were ascertained.

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	Categories			
Unprocessed red meat, g/d (median)	< 25.0 (17.0)	25.0-49.9	50.0-74.9	≥ 75.0 (83.2)
Person-years	45 174	165 112	117 870	147 671
No. of cases	64	93	82	27
Age-adjusted	1.00	1.10 (0.79-1.51)	1.14 (0.82-1.58)	0.86 (0.54-1.37)
Multivariable model*†	1.00	1.14 (0.81-1.60)	1.20 (0.85-1.71)	0.77 (0.47-1.27)
Processed red meat, g/d (median)	< 25.0 (15.5)	25.0-49.9	50.0-74.9	≥ 75.0 (89.7)
Person-years	133 561	217 360	83 790	41 118
No. of cases	90	106	43	27
Age-adjusted	1.00	1.11 (0.83-1.47)	1.27 (0.89-1.83)	2.26 (1.46-3.48)
Multivariable model*†	1.00	1.22 (0.91-1.63)	1.42 (0.97-2.07)	2.43 (1.52-3.88)
Total red meat, g/d (median)	< 50.0 (37.2)	50.0-99.9	100-149.9	≥ 150 (175)
Person-years	60 852	193 228	170 334	51 415
No. of cases	56	132	58	20
Age-adjusted	1.00	0.97 (0.71-1.33)	1.04 (0.72-1.51)	1.28 (0.76-2.13)
Multivariable model*	1.00	1.07 (0.77-1.48)	1.19 (0.80-1.78)	1.30 (0.75-2.27)



2.26 (1.46-3.48)
2.43 (1.52-3.88)

Processed and Unprocessed Red Meat Consumption and Risk of Heart Failure: A Prospective Study of Men

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- Men who consumed ≥ 75 g/d processed red meat compared to those who consumed < 25 g/d had
 - 1.28 (95% CI: 1.10-1.48, P -trend = 0.01) higher risk of HF incidence and
 - 2.43 (95% CI: 1.52-3.88, P -trend <0.001) higher risk of HF mortality.
 - With increased risk of incidence of HF or mortality from HF.

Eggs & CVD

Regular egg consumption increase CAD in DM.

Qureshi AI. Med Sci Monit 2007;13:CR1-8

Table 3. Weekly egg consumption and risk for stroke, coronary artery disease, and mortality among persons with diabetes mellitus in NHANES-I* Epidemiologic Follow-up Study, 1982–1992.

Categories according to weekly egg consumption	Total number/per person-years	Event/per person-years	Event rate	Age adjusted RR (95% CI)	Multivariate adjusted** RR (95% CI)
All stroke					
No or less than 1 egg	47 (576.7) yr	8 (104.4) yr	17.0	Referent	Referent
1 to 6 eggs	174 (2218.0) yr	37 (427.4) yr	21.3	1.1 (0.5–2.3)	1.1 (0.5–2.5)
Greater than 6 eggs	128 (1493.7) yr	12 (110.8) yr p=0.08663	9.4	0.6 (0.2–1.4)	0.6 (0.2–1.5)
Ischemic stroke					
No or less than 1 egg	47 (576.7) yr	8 (74.3) yr	17.0	Referent	Referent
1 to 6 eggs	174 (2218.0) yr	32 (308.0) yr	18.4	0.9 (0.4–2.0)	1.1 (0.4–2.1)
Greater than 6 eggs	128 (1493.7) yr	11 (88.0) yr p=0.08212	8.6	0.5 (0.2–1.3)	0.5 (0.2–1.4)
Coronary artery disease					
No or less than 1 egg	47 (576.7) yr	13 (94.2) yr	27.7	Referent	Referent
1 to 6 eggs	174 (2218.0) yr	63 (581.8) yr	36.2	1.2 (0.7–2.2)	1.2 (0.7–2.3)
Greater than 6 eggs	128 (1493.7) yr	56 (469.1) yr p=0.16783	43.8	1.9 (1.1–3.5)	1.9 (1.0–3.5)
Mortality					
No or less than 1 egg	47 (576.7) yr	33 (318.9) yr	70.2	Referent	Referent
1 to 6 eggs	174 (2218.0) yr	128 (1348.7) yr	73.6	0.9 (0.6–1.4)	1.0 (0.7–1.5)
Greater than 6 eggs	128 (1493.7) yr	92 (847.4) yr p=0.98392	71.9	1.2 (0.8–1.8)	1.3 (0.9–1.9)

Egg consumption & HF

Djousse L. Circulation 2008;117:512-6.

- Prospective cohort 21,275 male from Physicians' Health Study I.
- Egg consumption: assessed with simple abbreviated food questionnaire, Cox regression to estimate relative risks of HF.
- Follow-up 20.4 yrs, total 1084 new HF cases

Egg consumption & HF in male physicians

Djousse L. Circulation 2008;117:512-6.s

Table 2. Relative Risk (95% Confidence Interval) of HF According to Egg Consumption

Egg Intake	Cases	Hazard Ratios for HF (95% Confidence Interval)			
		Crude	Age-Adjusted	Model 1*	Model 2†
<1/wk	206	1.0	1.0	1.0	1.0
1/wk	307	1.02 (0.85–1.22)	0.99 (0.83–1.18)	0.93 (0.80–1.16)	0.93 (0.78–1.12)
2–4/wk	359	1.15 (0.97–1.37)	1.10 (0.92–1.30)	1.02 (0.83–1.19)	1.03 (0.86–1.22)
5–6/wk	75	1.19 (0.91–1.55)	1.12 (0.86–1.45)	1.01 (0.78–1.32)	1.01 (0.78–1.32)
1/d	112	1.96 (1.56–2.46)	1.47 (1.17–1.85)	1.27 (1.01–1.60)	1.28 (1.02–1.61)
≥2/d	25	2.45 (1.62–3.71)	1.94 (1.28–2.95)	1.61 (1.06–2.44)	1.64 (1.08–2.49)
<i>P</i> for trend		<0.0001	<0.0001	0.007	0.006

*Adjusted for age (<45, 45–49, 50–54, 55–59, 60–64, and ≥65), body mass index (<25, 25–29.9, ≥30 kg/m²), smoking (never, former, current smokers), alcohol consumption (<1, 1–4, 5–7, ≥8 drinks per week), and history of diabetes mellitus, atrial fibrillation, and hypertension.

†Additional adjustment for physical activity (<1/wk, ≥1/wk) and history of valvular heart disease and treatment for cholesterol.

Egg consumption & HF in male physicians

Djousse L. Circulation 2008;117:512-6.s

Table 3. Relative Risk (95% Confidence Interval) of HF Without Antecedent Myocardial Infarction According to Egg Consumption

Egg Intake	Cases	Hazard Ratios for HF (95% Confidence Interval)			
		Crude	Age-Adjusted	Model 1*	Model 2†
<1/wk	178	1.0	1.0	1.0	1.0
1/wk	252	0.97 (0.80–1.17)	0.94 (0.77–1.14)	0.89 (0.73–1.08)	0.89 (0.73–1.07)
2–4/wk	294	1.09 (0.91–1.32)	1.04 (0.86–1.25)	0.97 (0.80–1.17)	0.97 (0.80–1.16)
5–6/wk	64	1.18 (0.88–1.57)	1.10 (0.83–1.46)	0.99 (0.75–1.32)	0.99 (0.74–1.31)
1/d	102	2.06 (1.62–2.63)	1.54 (1.21–1.97)	1.33 (1.04–1.69)	1.33 (1.04–1.70)
≥2/d	21	2.38 (1.51–3.74)	1.88 (1.20–2.95)	1.55 (0.99–2.44)	1.56 (0.99–2.46)
<i>P</i> for trend		<0.0001	<0.0001	0.007	0.006

*Adjusted for age (<45, 45–49, 50–54, 55–59, 60–64, and ≥65 y), body mass index (<25, 25–29.9, ≥30 kg/m²), smoking (never, former, current smokers), alcohol consumption (<1, 1–4, 5–7, ≥8 drinks per week), and history of diabetes mellitus, atrial fibrillation, and hypertension.

†Additional adjustment for physical activity (<1/wk, ≥1/wk) and history of valvular heart disease and treatment for cholesterol.

Eggs & high fat dairy greater HF risk

Nettleton JA. J Am Diet Assoc 2008;108:1881-87

- Incident HF (death or hospitalization) & 7 food categories: (whole grains, fruits/vegetables, fish, nuts, high-fat dairy, eggs, red meat):observational cohort 14,153 African-American and white adults, age 45-64 yrs, sampled from four US communities.
- Baseline (1987-89) and Exam 3 (1993-95), dietary intake: 66-item food frequency questionnaire administered at baseline;
- Intake on averaged baseline & Exam 3 responses.
- During mean 13 yrs, 1,140 HF hospitalizations.

Eggs & high fat dairy greater HF risk

Nettleton JA. J Am Diet Assoc 2008;108:1881-87

Table 2. Relative risks for heart failure risk according to food group intakes (servings/day) in 15,143 men and women from the Atherosclerosis Risk in Communities Study

	Relative risk (95% confidence interval)^a
Whole grains	
Model 1: energy-adjusted ^b	0.85 (0.80, 0.90)*
Model 2: energy, demographic, lifestyle, and prevalent disease-adjusted ^c	0.93 (0.87, 0.99)*
Fruits and vegetables	
Model 1	1.01 (0.98, 1.04)
Model 2	1.02 (0.99, 1.05)
High-fat dairy	
Model 1	1.14 (1.06, 1.22)*
Model 2	1.08 (1.01, 1.16)*
Eggs	
Model 1	1.56 (1.40, 1.73)*
Model 2	1.23 (1.08, 1.41)*
Red meat or processed meat	
Model 1	1.27 (1.18, 1.37)*
Model 2	1.07 (0.97, 1.17)

Dietary supplements ?

อาหารเสริม ?

