The role of omega-3 fatty acids in dyslipidemia & cardiovascular disease

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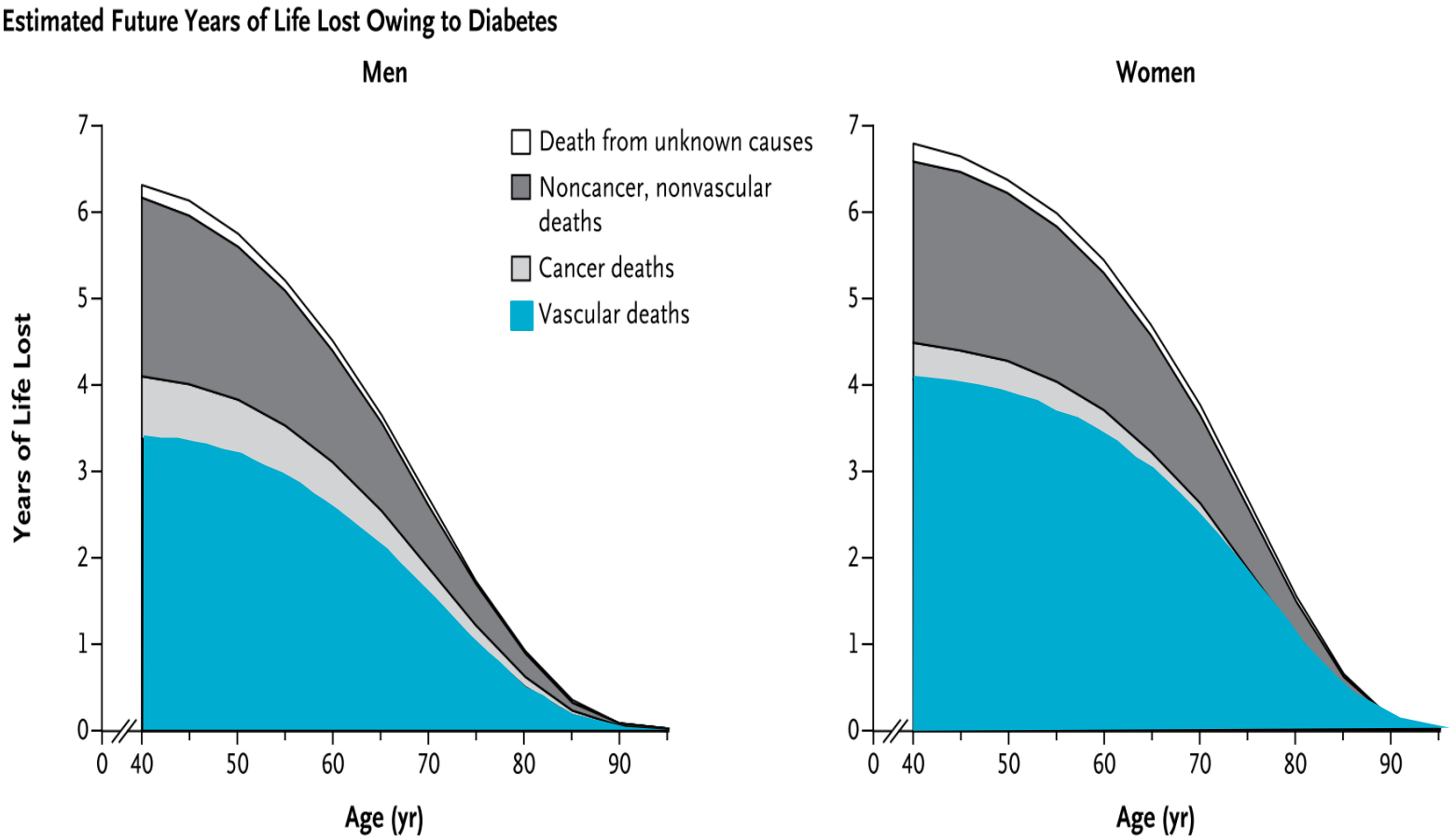
2017年健保花費前10大疾病

Health 2 Sync

疾病別	醫療費用 (億元)	就醫人數 (萬人)
急慢性腎病	503.63	35.8
口腔睡液線疾病	443.23	1148.6
糖尿病	296.87	149.2
急性上呼吸道感染	253.66	1395.2
高血壓	237.72	239
消化器官癌症	191.48	16.9
腦血管疾病	182.59	40.6
缺血性心臟病	179.80	55.1
流行性感冒及肺炎	146.03	164.6
思覺失調症/妄想性疾病	127.04	13.4

資料來源：衛福部健保署

Vascular diseases attribute 58% cause of death in diabetes

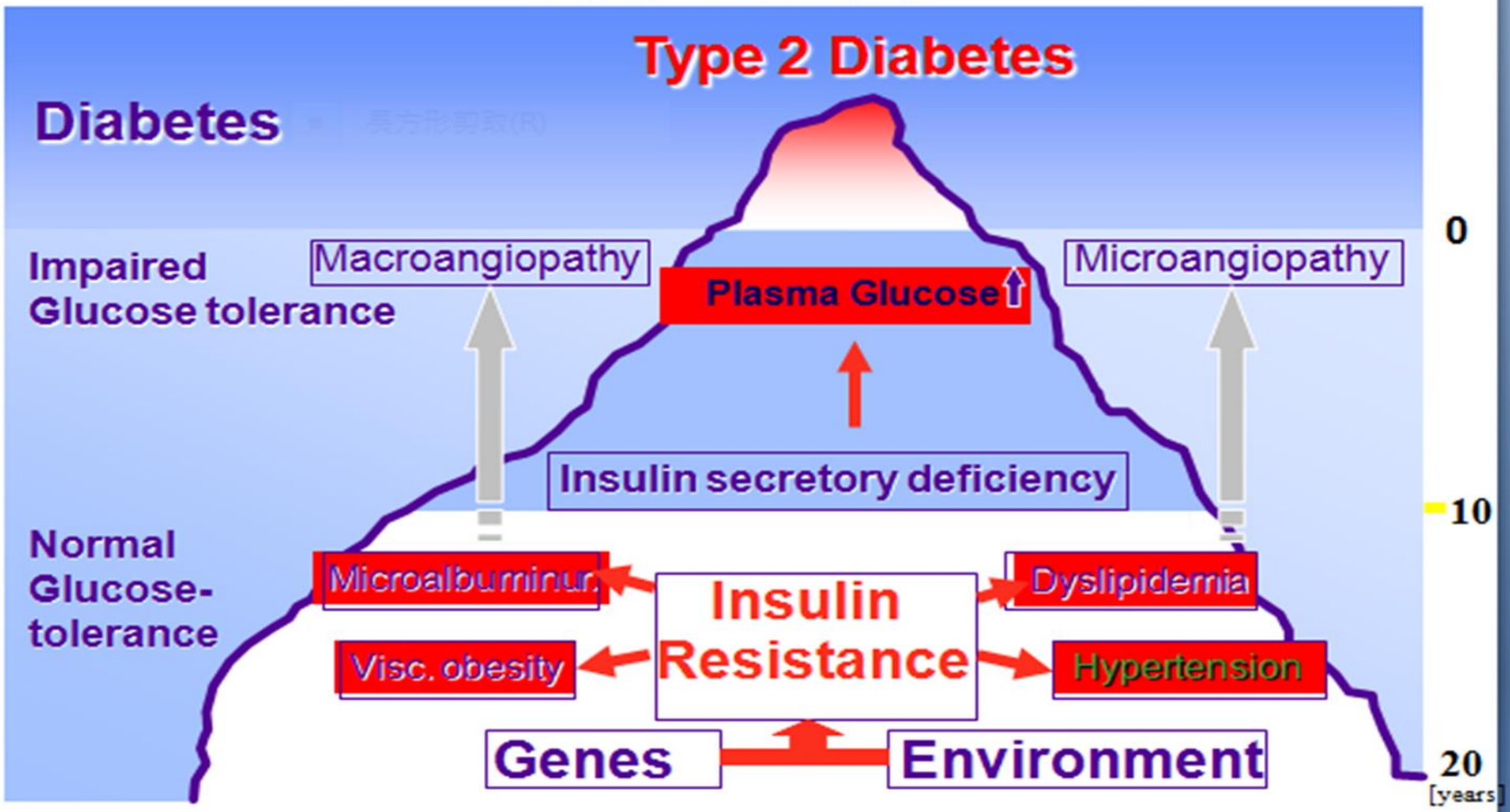


On average, middle-aged adults with diabetes would incur about 6 years of life lost than people without diabetes

Data were analyzed from individual-participant data on 123,205 deaths among **820,900 people** in 97 prospective studies.
Seshasai et al. N Engl J Med 2011;364:829-41

Pathophysiology of Type 2 Diabetes

The Tip of the Iceberg



Matthaei et al., *Endocrine Reviews* 21:585-618 (2000)

UKPDS*: Order of Importance of CHD Risk Factors

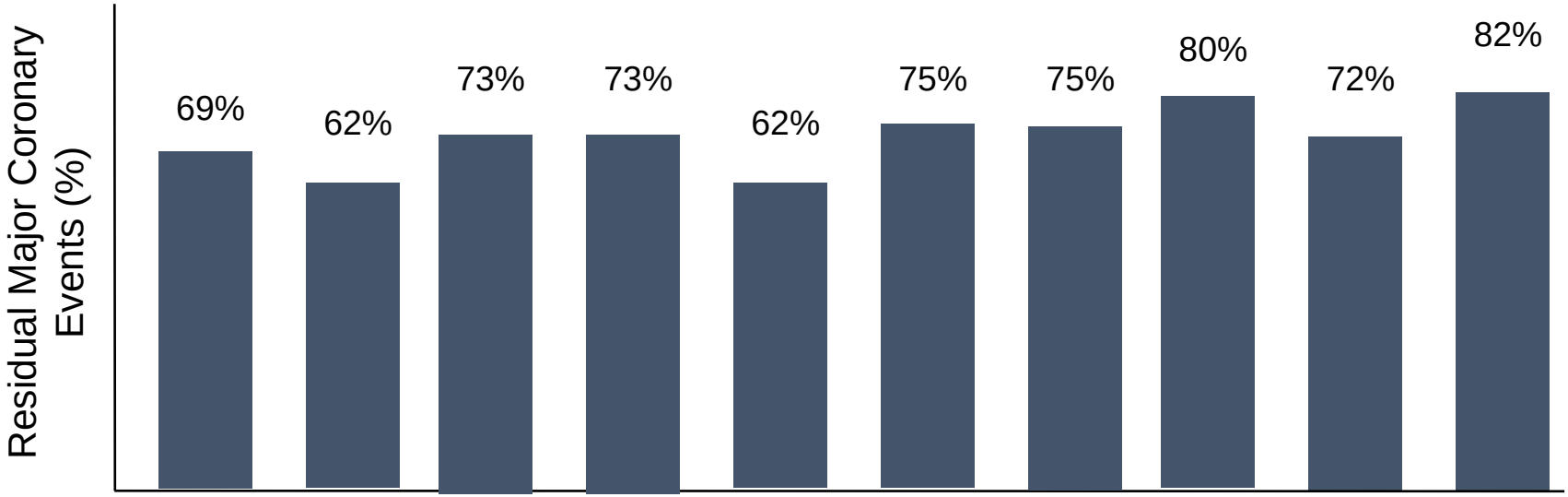
Stepwise selection of risk factors, adjusted for age and sex, in 2693 white patients with diabetes, with dependent variable as time to first CHD event.

Variable	*P*-value
1. LDL-C	<0.0001
2. HDL-C	0.0001
3. HbA_{1c}	0.0022
4. Systolic BP	0.0065
5. Smoking	0.056

*United Kingdom Prospective Diabetes Study.

Turner RC et al. *BMJ*. 1998;316:823-828.

服用Statin後仍有 6~7成心血管殘餘風險

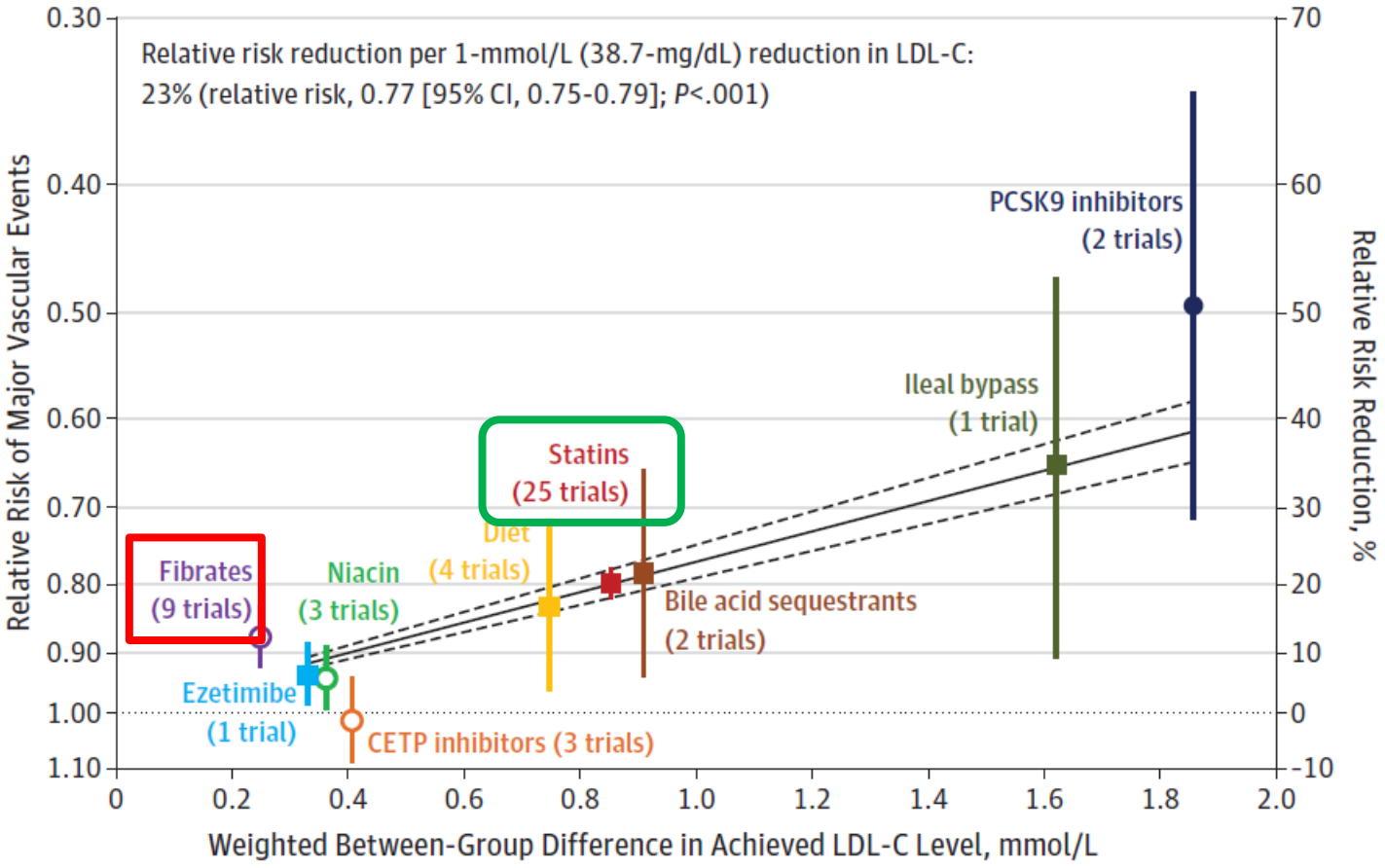


Trial	WOSCOPS	AFCAPS/ TexCAPS	HPS	ASPEN	4S	LIPID	CARE	TNT Total	TNT Met S	TNT Diabetes
N	6.595	6.505	20.536	2.410	4.444	9.014	4.159	10.001	5.584	1.501
Δ LDL-C	-26%	-27%	-29%	-29%	-36%	-25%	-28%	-21%	-24%	-20%

Adapted from Libby P, J Am Coll Cardiol 2005;46:1225-1228

Statins reduce 20% CVRR

25 trials of statins with consistent relative risk reduction



5. 2016 JAMA 316 (12): 1289-1297

in dyslipidemia

TG的重要性

Secondary Causes of Hypertriglyceridemia

- Positive-energy balanced diet with high saturated fat or high glycemic index content
- Obesity
- Uncontrolled diabetes
- Hypothyroidism
- Nephrotic syndrome
- Various medications: antiretroviral regimens, some phenothiazines and second-generation antipsychotics, nonselective beta-blockers, thiazide diuretics, oral estrogens, glucocorticosteroids, tamoxifen, isotretinoin
- Excessive alcohol consumption

Bays HE. *The Johns Hopkins Textbook on Dyslipidemia.* 2010:245-257.[3]

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Obesity

ABSTRACT

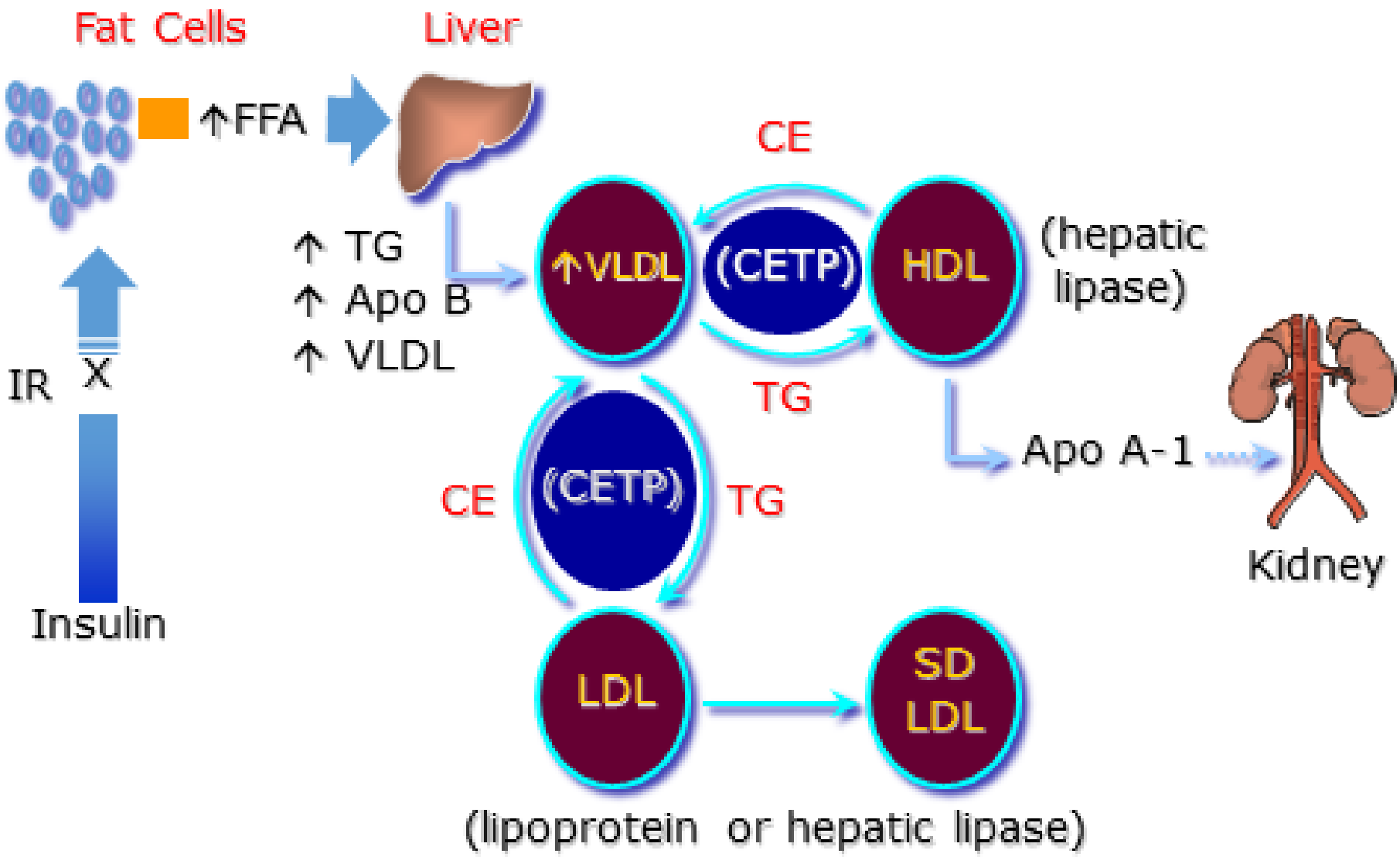
Background and aims: Non-LDL dyslipidemia (NLD) confers cardiovascular risk, and prevalence rates appear to be high in elderly populations. Small cohorts have identified several lifestyle, anthropometric, and medical factors associated with NLD. We aimed to assess sex- and age-specific prevalence of NLD in a contemporary population cohort (n = 167 729), and to identify independent determinants of NLD, focusing on lifestyle, anthropometric, and medical factors.

Methods: The prevalence of NLD was assessed per 10-year age intervals in adults without cardiovascular disease not using lipid-modifying drugs from the Dutch LifeLines cohort. NLD was defined as low HDL-cholesterol or high triglycerides or high remnant cholesterol as per guideline cut-off values. Multivariable regression was used to identify factors independently associated with NLD. Determinants included age, smoking, alcohol use, physical activity, diet, BMI, diabetes mellitus (DM), chronic kidney disease, and in women, menopausal state and oral contraceptive use.

Results: NLD occurred in 15–19% of women and 13–30% of men in this cohort, with the highest prevalence of 30% in 35–55 year old men. In most age groups, the prevalence in women was lower than in men. Obesity (both sexes: Odds ratio (OR) 5.3, 95% confidence interval (95%CI) 5.0–5.7), current smoking (men: OR 1.8, 95%CI 1.7–1.9; women OR 2.2, 95%CI 2.1–2.3), and DM (men: OR 2.2, 95%CI 1.8–2.6; women: OR 2.7, 95%CI 2.3–3.1) were strongly associated with NLD.

Conclusions: NLD already occurs frequently at an early age. Modifiable lifestyle choices, obesity, and DM were strong determinants of NLD. Public health efforts could substantially contribute to decrease NLD.

TG過高亦會降低HDL及增加sdLDL



進一步分析這群無肝炎的肝癌患者罹癌風險，研究團隊找出了三大風險因子，分別為脂肪肝糖尿病史、三酸甘油脂過高，若再把這三組病患分為有酒癮和沒有酒癮者，結果發現，沒有酒癮的無慢性病毒肝炎的肝癌患者中，三個代謝性疾病風險因子，該研究成果刊登於4月美國[illegible]LD）官方期刊

Triglyceride大於
160 mg/dL

黃秀芬指出，有酒癮、也無肝炎、肝硬化，也可能罹患肝癌，女性的風險更高。她建議國健署，應該將脂肪肝、糖尿病史、三酸甘油脂過高等民眾，納入公費肝癌篩檢的對象。如果這項三項因子都有者，屬於肝癌高風險族群，應該定期回診，接受超音波檢查。

表一、糖尿病人血脂目標

主要目標		說明
低密度脂蛋白膽固醇	所有病人 <100 mg/dl 已有心血管疾病 <70 mg/dl	建議使用中 / 強效果的 statins 為第一線藥物治療
高密度脂蛋白膽固醇	男 >40 mg/dl 女 >50 mg/dl	生活型態介入治療及血糖控制為優先
三酸甘油酯	<150 mg/dl	血糖控制及生活型態介入治療為優先。但三酸甘油酯 ≥500 mg/dl，需給 fibrates
次要目標		
非高密度脂蛋白膽固醇	所有病人 <130 mg/dl 已有心血管疾病 <100 mg/dl	當主要目標達成時，再評估次要目標

Omacor是CKD患者最好的選擇

Lipanthyl在CKD患者要調劑量非常麻煩

Lopid在CKD患者要注意不能並用Statin

表二　慢性腎臟病病人降血脂藥物治療建議應根據腎功能調整劑量

藥物品項	肌酸酐廓清率 (Ccr) 60-90 ml/min/1.73m^2	肌酸酐廓清率 (Ccr) 30-59 ml/min/1.73m^2	肌酸酐廓清率 (Ccr) 15-29 ml/min/1.73m^2	肌酸酐廓清率 (Ccr) < 15 ml/min/1.73m^2
Statin				
Atorvastatin	不需調整劑量			
Pravastatin	不需調整劑量			
Simvastatin	不需調整劑量		從 5 mg/day 起小心使用	
Fluvastatin	不需調整劑量	證據不明，Ccr<30 ml/min 考慮從低劑量起用		
Rosuvastatin	不需調整劑量		從 5 mg/day 起小心使用，最大劑量 10 mg/day	
Lovastatin	不需調整劑量	考慮減半劑量使用		
Nonstatin				
Cholestyramine	證據不明，腎功能不佳者考慮從低劑量開始使用			
Colesevelam	不需調整劑量			
Ezetimibe	不需調整劑量	→ CKD 3~5		
Fenofibrate	減半劑量使用	減成 1/4 劑量使用		禁忌使用
Gemfibrozil	不需調整劑量	歐盟及臺灣已禁止Gemfibrozil與Statin並用		
Nicotinic acid	證據不明，腎功能不佳者考慮從低劑量開始使用			
Omega-3 fatty acid	不需調整劑量			

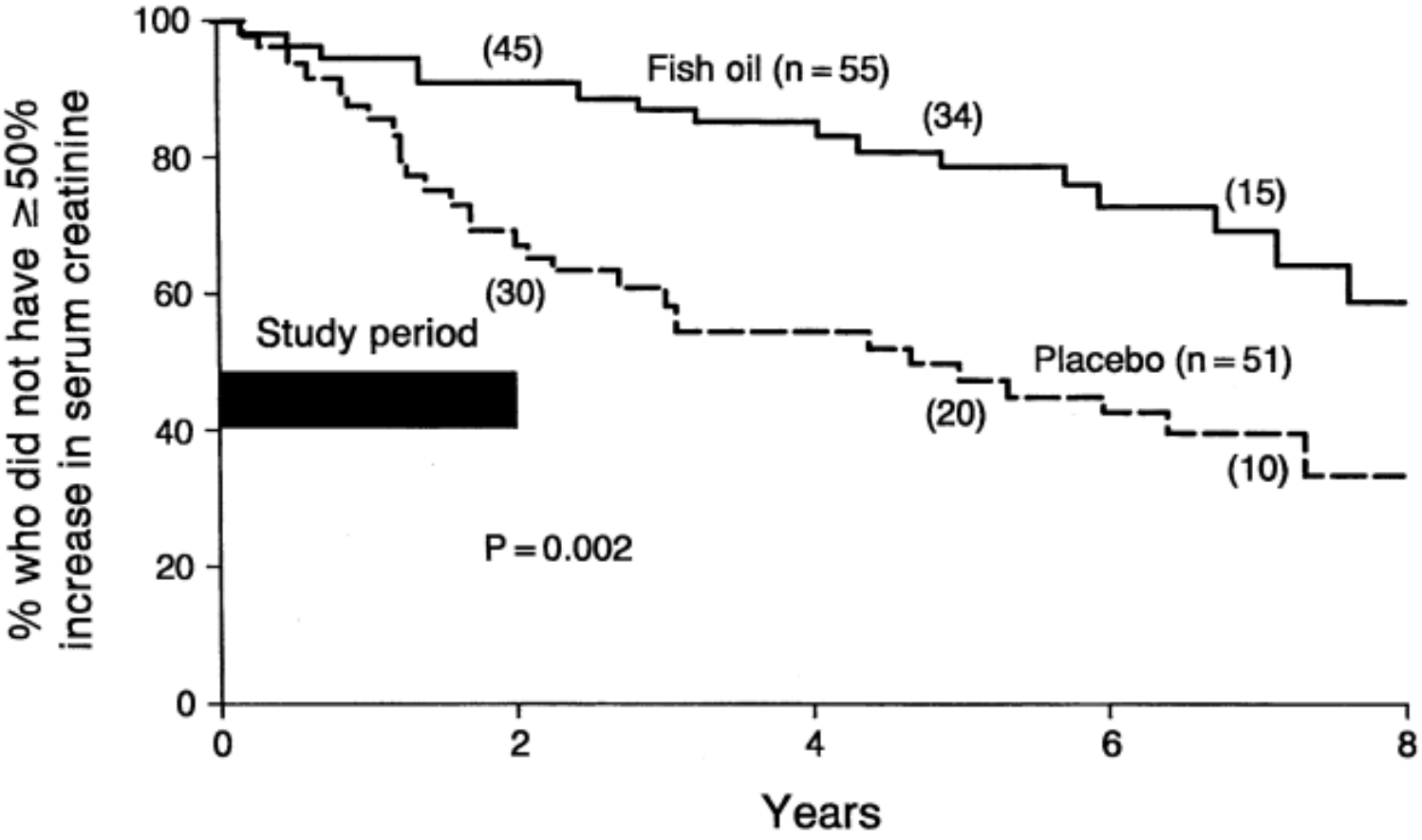
* 以上乃依據最新藥物使用建議，根據腎功能調整劑量。

2015 臺灣慢性腎臟病臨床診療指引專書

Taiwan Chronic Kidney Disease Clinical Guidelines

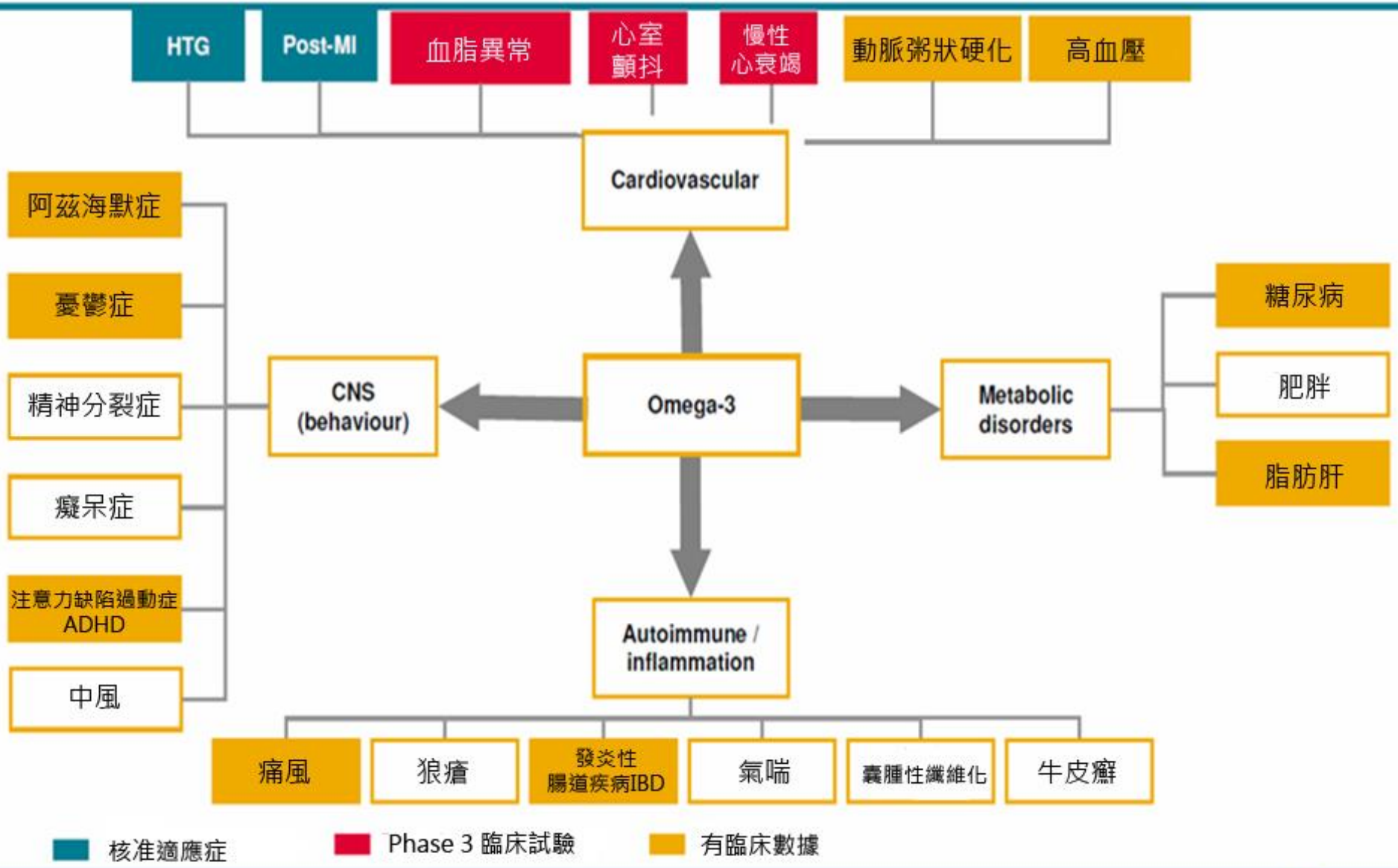
建議強度	建議（上）/ 實證內容（下）	證據等級	文獻編號
	國際建議中之 PUFA 與 MUFA 之比例並無實證基礎。	4	13,47-48
	國人常用烹飪用油 PUFA/MUFA 比值偏高。	4	40
A	CKD 病人補充 ω-3 多元不飽和脂肪酸可降低心血管疾病的風險。		
	CKD 病人以 ω-3 PUFAs 取代 MUFAs 或碳水化合物來補充熱量，可降低血清 TG 濃度及心血管疾病的風險。	2+ 1++	52 53
	非末期腎病的 CKD 病人補充二十二碳六烯酸（DHA）及二十碳五烯酸（EPA），可降低血清 TG 濃度及心血管疾病的風險。	2+ 1+	54-55,57 56

The long-term outcome of patients with IgA nephropathy treated with fish oil in a controlled trial

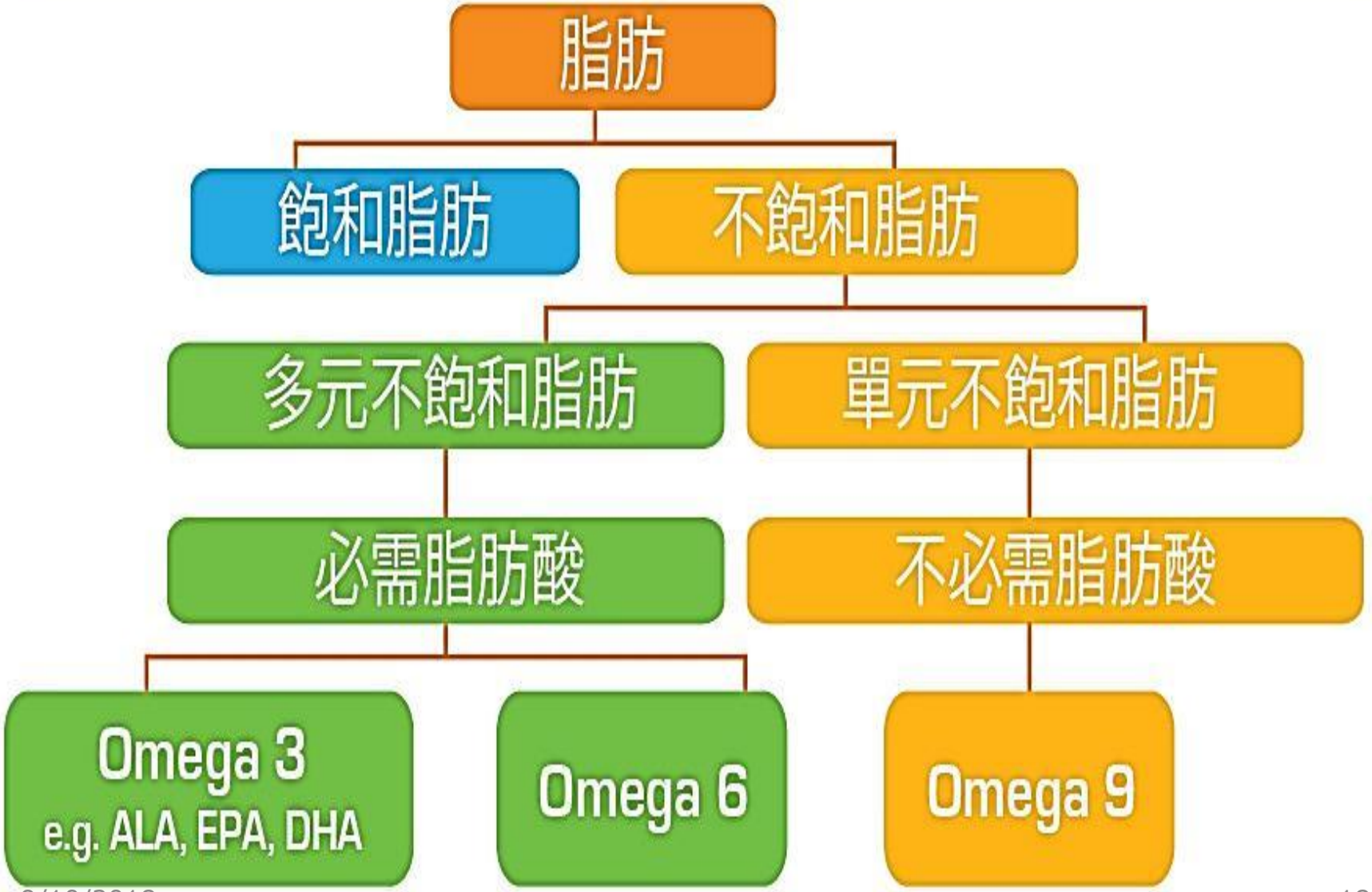


J Am Soc Nephrol 10:1772–1777, 1999. 2

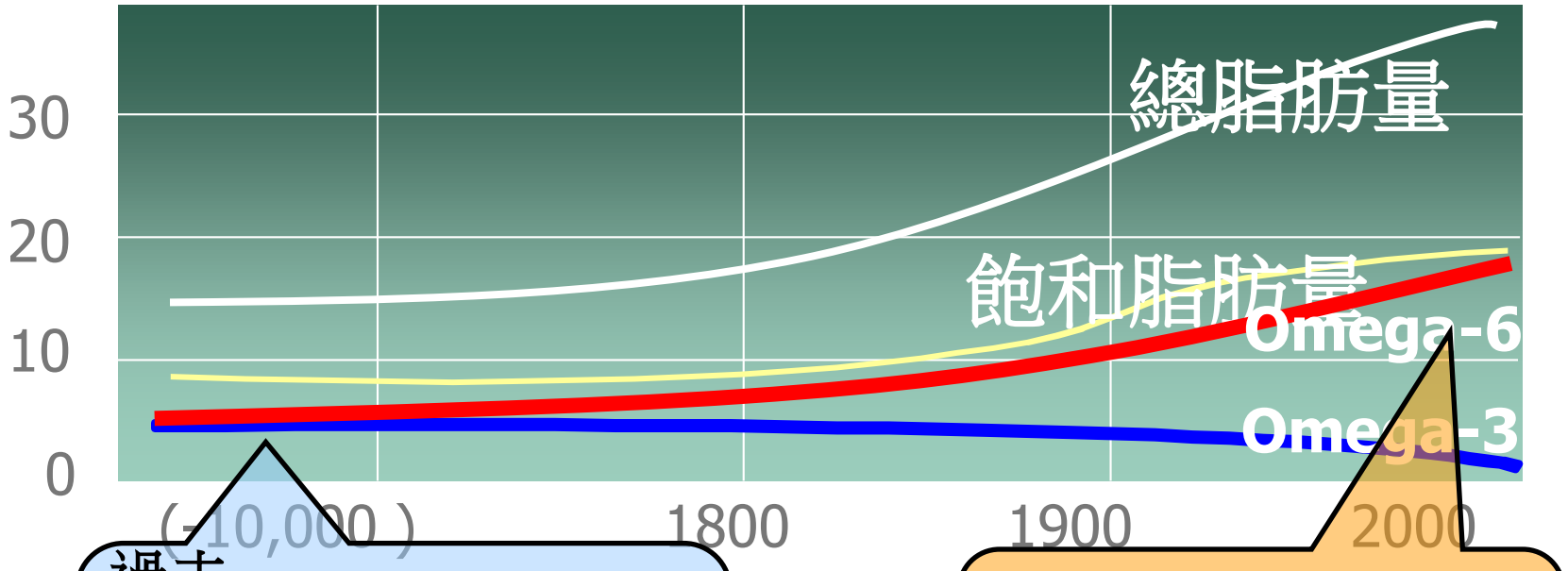
Potential for Omega-3 derived pharmaceuticals



脂肪分類


脂肪
飽和脂肪
不飽和脂肪
多元不飽和脂肪
單元不飽和脂肪
必需脂肪酸
不必需脂肪酸
Omega 3
e.g. ALA, EPA, DHA
Omega 6
Omega 9

人類攝取脂肪酸比例的逐漸失衡



過去
omega-6:omega-3
攝取均衡比率約為**1:1**

如今
omega-6:omega-3
已偏離將近至**20:1**

Omega-6/Omega-3 Rations in Different Populations

Population	ω-6/ω-3
Paleolithic 旧石器時代	0.79
Greece prior to 1960	1.00–2.00
Current Japan	4.00
Current India, rural	5–6.1
Current UK and northern Europe	15.00
Current US	16.74
Current India, urban	38–50

Nutrients 2016, 8, 128

Metabolic Pathways of Omega-3 and Omega-6 Fatty Acids

Omega-6 亞油酸
Linoleic Acid (LA)

Polyunsaturated oils, including flax, corn and safflower

Omega-3 亞麻酸
Alpha-Linolenic Acid (ALA)

Black Currant (15%) Flax (85%)

Potential Benefits of Omega-3 Fatty Acids

Dyslipidemia
- Reduces triglycerides

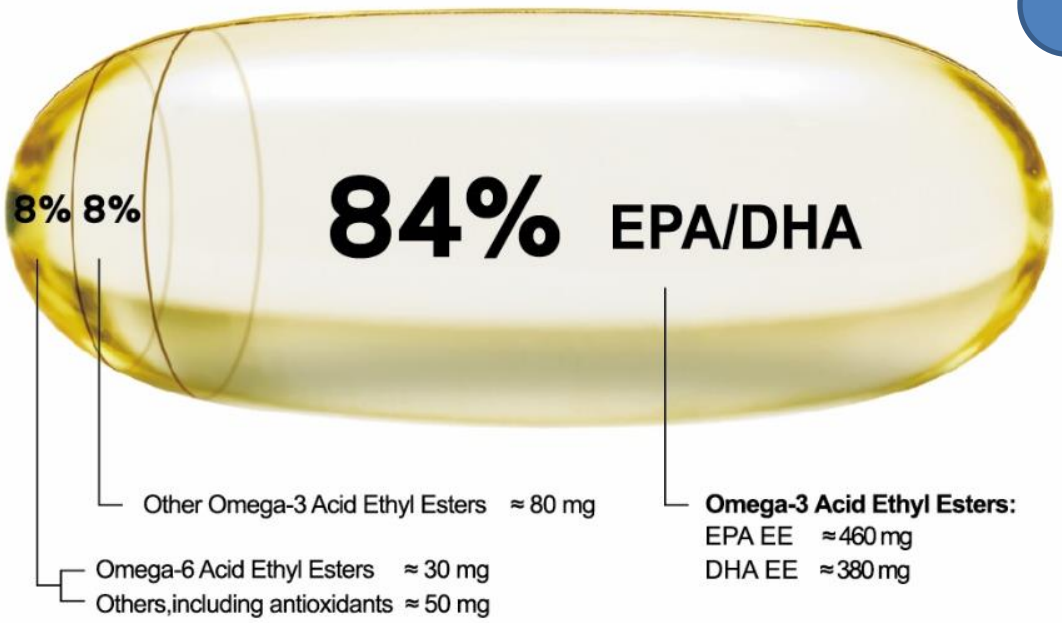
Cardiac
- Anti – Hypertensive
- Anti-arrythmic
- Anti-thrombotic

Atherosclerosis
- Anti-inflammatory
- Haemostatic
- Vasodilation
- Anti-platelet

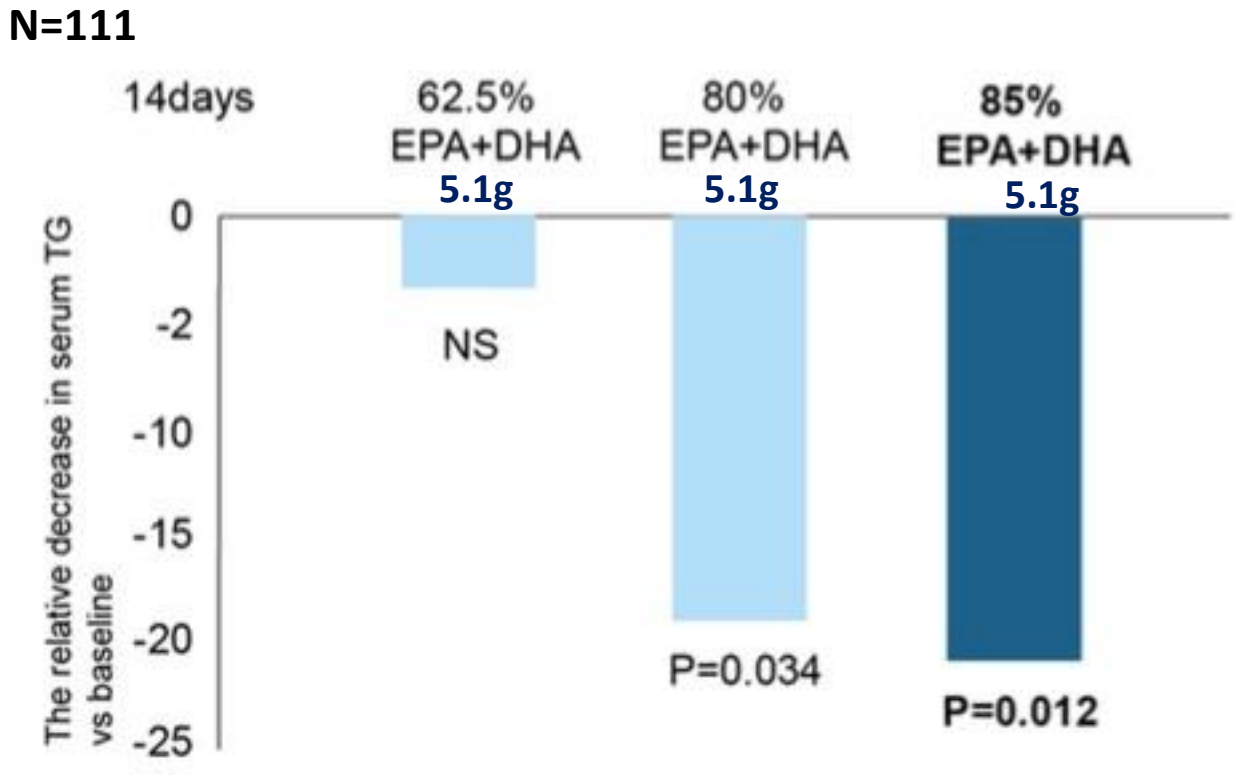
Non-cardiac
- Ulcerative Colitis
- Rheumatoid Arthritis
- SLE
- Septicaemia

OMACOR® 中的
EPA/DHA 濃度超過 84%
omega-3 PUFA 濃度超過 90%

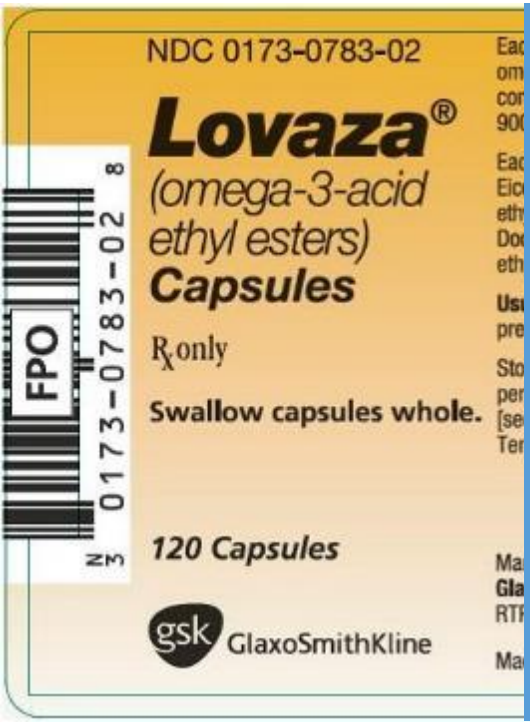
一般市售保健食品魚油濃度8成都低於30%



臨床實驗證明80%以上EPA/DHA濃度才有降血脂能力



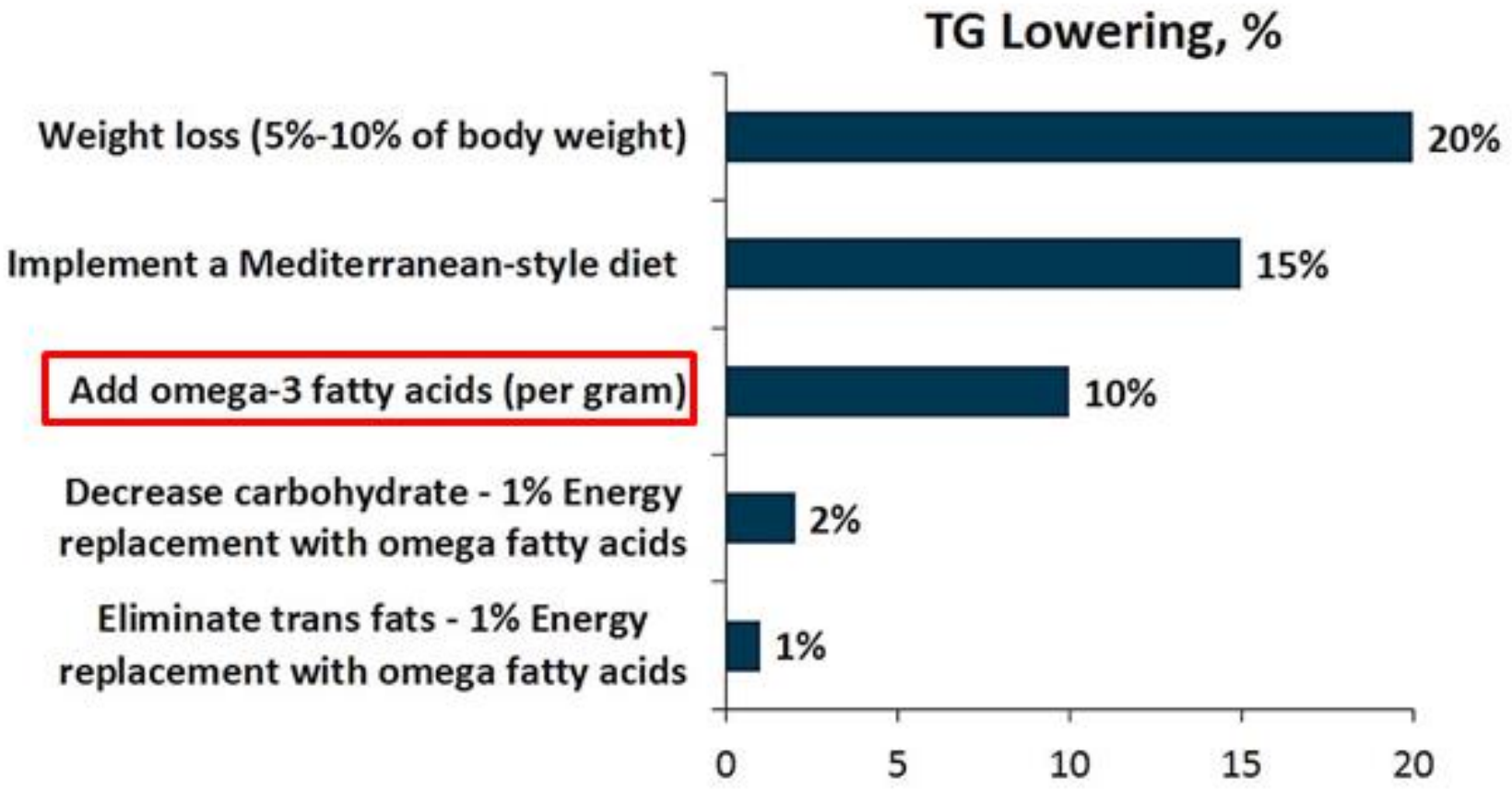
Prostaglandins, Leukotrienes and Essential Fatty Acids 75 (2006) 19–24



在歐洲，他叫Omacor
在美國，他叫Lovaza
在日本，他叫Lotriga

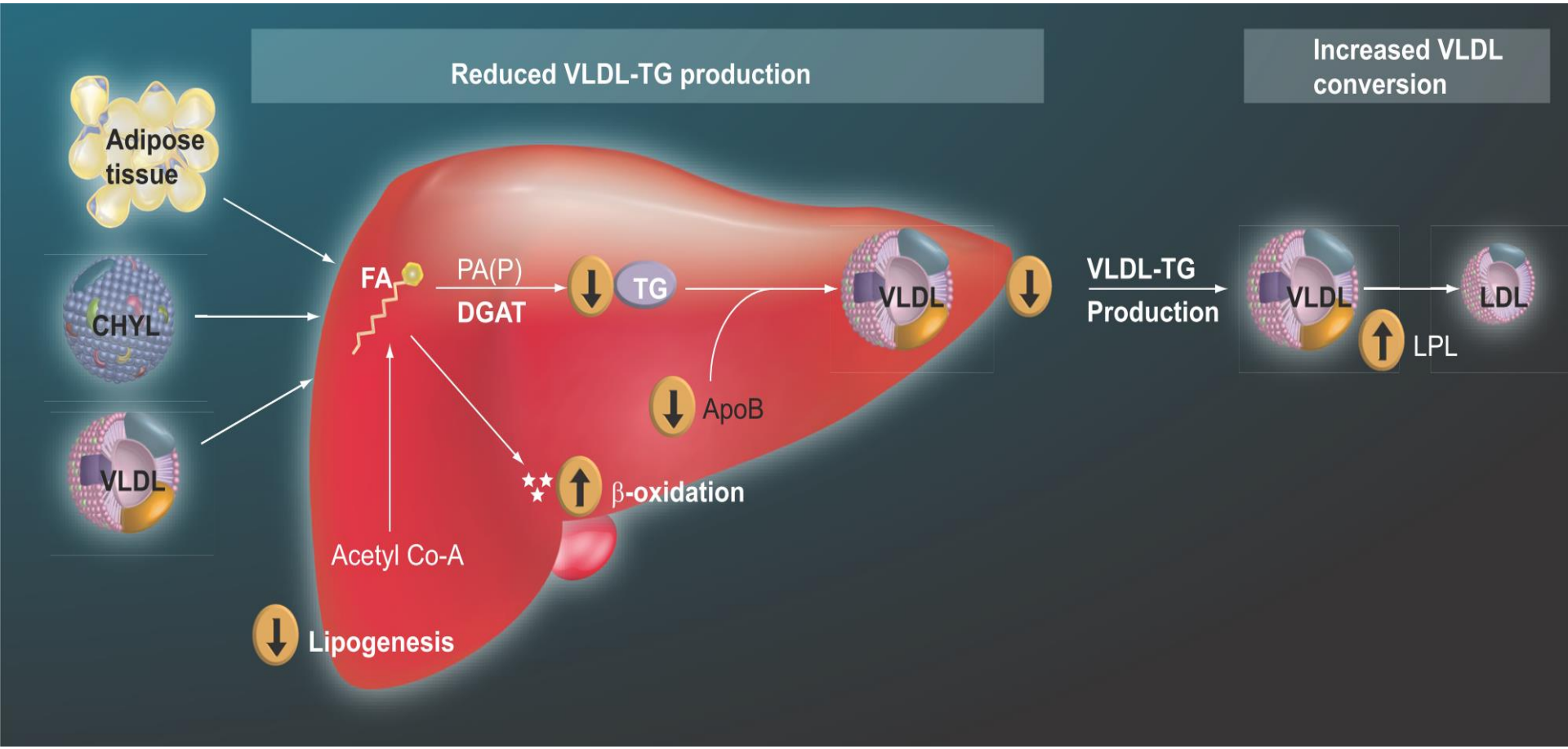
在台灣，我們稱他為Omacor(脂妙清膠囊)

Effects of Nutrition Practices on TG Lowering



Miller M, et al. *Circulation*. 2011;123:2292-2333.[7]

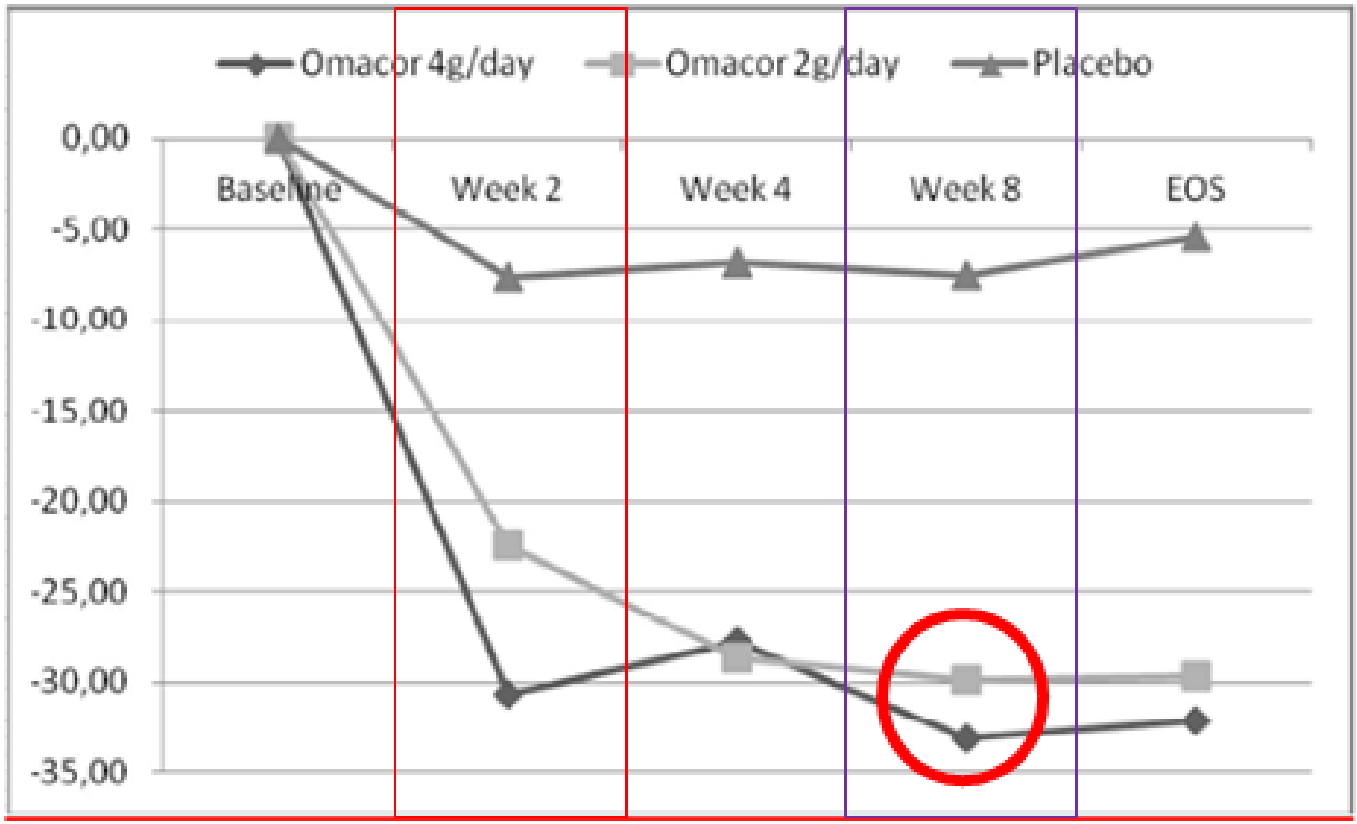
Triglyceride-Lowering Mechanisms of Omega-3 FA



Expert Rev Cardiovasc Ther. 2008;6(3):391-409

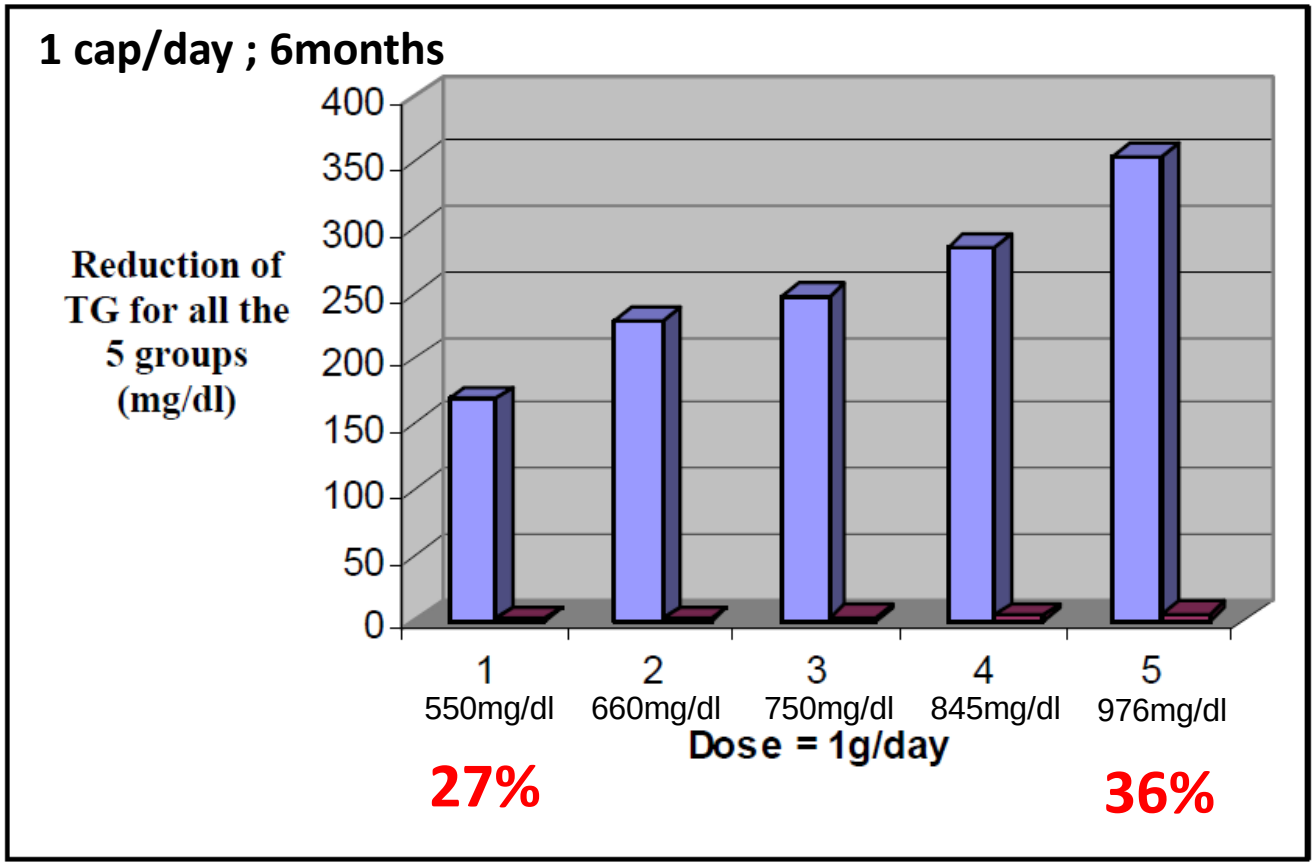
根據台灣臨床試驗，每天2顆
2週即有明顯療效，8週達最大療效

Figure 2. Time-course of Percent Change in Triglyceride Level (ITT population)



OMACOR Clinical Trial in Tawian

一天一顆仍有顯著療效



ROM. J. INTERN. MED., 2008, **46,** *1*, 81–86

已使用Fenofibrate的患者，併用OMACOR後可額外降TG達17.5%

並用OMACOR與Fibrate是安全的

Treatment-Emergent Adverse Event (AE): Overview

TABLE 2. Incidence of Adverse Events (n [%] of Subjects)

	P-OM3 + FENO (n = 84)	Placebo + FENO (n = 83)	P-OM3 + FENO ext P-OM3 + FENO (n = 59)	Placebo + FENO ext P-OM3 + FENO (n = 58)	2nd Extension P-OM3 + FENO (n = 89)
Any adverse events	55 (65.5)	53 (63.9)	24 (40.7)	29 (50.0)	69 (77.5)
Serious adverse events	3 (3.6)	1 (1.2)	0 (0)	1 (1.7)	4 (4.5)
Related to study drug*	13 (15.5)	13 (15.7)	4 (6.8)	7 (12.1)	9 (10.1)

將OMACOR與Statin並用是安全的

Treatment-Emergent Adverse Event (AE): Overview

	Omacor + Atorvastatin (N=122)	Placebo + Atorvastatin (N=122)
Subjects with any AE	79 (64.8%)	72 (59.0%)
Subjects discontinuing for AE	8 (6.6%)	6 (4.9%)
Subjects with drug-related AE	16 (13.1%)	16 (13.1%)
Subjects with SAE	4 (3.3%)	2 (1.6%)
Subjects with drug-related SAE	0	0

SAE=serious adverse event

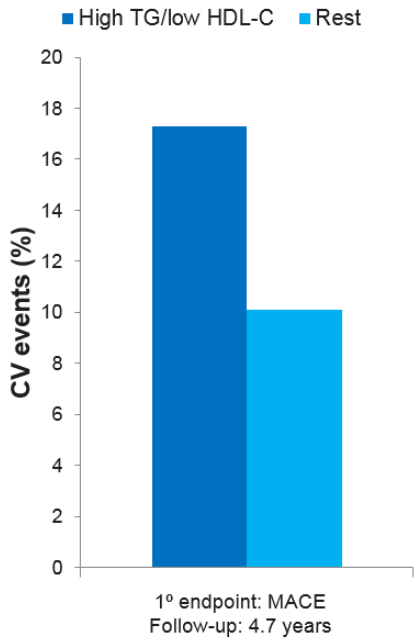
Maki K et al presented at ATVB meeting April 29, 2009

in cardiovascular disease

高風險族群，就算有在接受Statin治療，TG過高仍會明顯增加心血管疾病風險

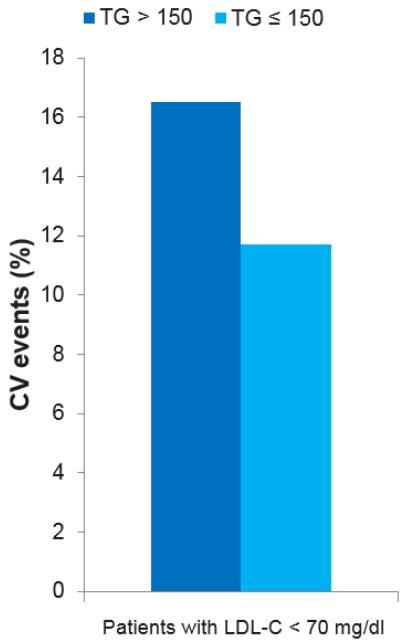
ACCORD-Lipid trial

- 5518 patients with T2DM
- All patients treated with simvastatin

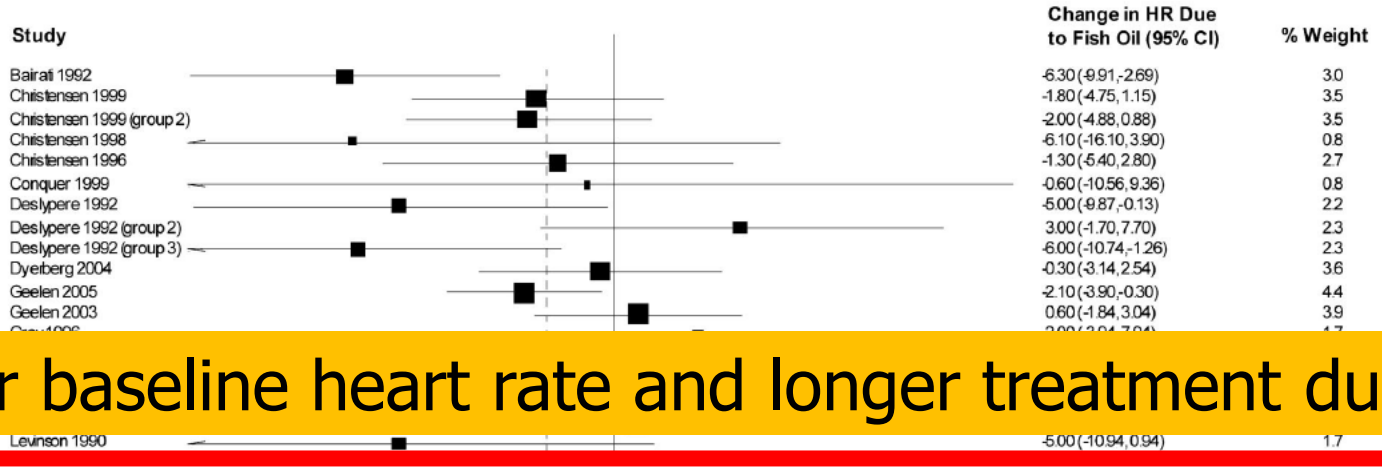


PROVE-IT TIMI

- Post ACS trial
  急性冠心症(acute coronary syndrome, ACS)
- All patients treated with atorvastatin 80 mg or pravastatin 40 mg



Omega-3 reduced heart rate



Higher baseline heart rate and longer treatment duration

- Direct effects on cardiac electrophysiological pathway
- Improving left ventricular diastolic filling
- Augmenting vagal tone

Mozaffarian D et al., Circulation 2005;112:1945-1952

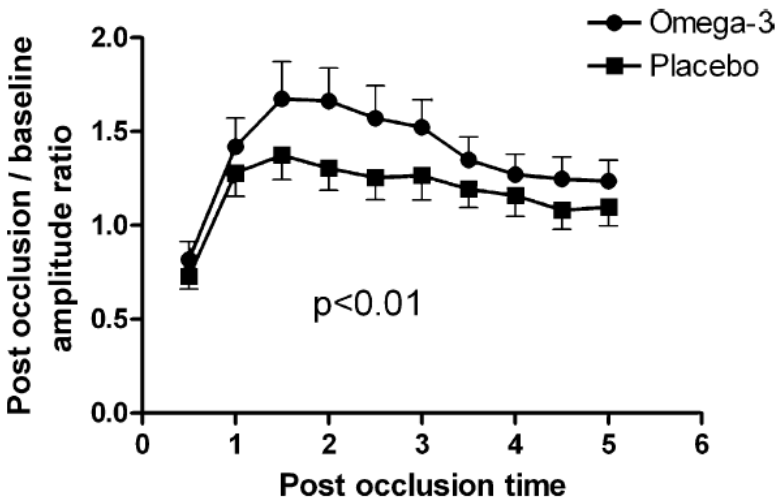
Omega-3 reduce blood pressure

- Increase NO production
- Mitigate vasoconstriction response to norepinephrine and angiotensin II
- Enhance vasodilatory responses
- Improve arterial compliance

	(mmHg)
Overall	2.27, −0.62)
Age	
⩽ 45 years	1.93, 0.01)
> 45 years	3.65, −1.03)
	0.089
Gender*	
Male/female	3.03, −0.91)
Male only	1.97, 0.52)
	0.13
Hypertension†	
No	1.61, 0.27)
Yes	3.95, −1.52)
	0.010
Body mass index	
⩽ 26.8 kg/m^2	2.58, −0.10)
> 26.8 kg/m^2	2.34, −0.17)
	0.93

Geleijnse JM et al., J Hypertens 2002;20:1493-1499

Omega-3 improves endothelial function



Subjects: obese adolescents
Intervention: Omega-3 1.2 g/days for 3 months
Measurement: Flow-mediated dilation (FMD)

	Omega-3	Placebo	*p*
SBP (mmHg)	111 ± 11	110 ± 11	0.67
DBP (mmHg)	64 ± 7	64 ± 6	0.61
HR (bpm)	67 ± 11	68 ± 8	0.62
PWV (m/s)	7.0 ± 0.9	7.0 ± 0.9	0.76
AI (%)	−15.0 ± 7.6	−11.4 ± 11.2	0.05
Intima thickness (mm)	0.055 ± 0.007	0.056 ± 0.009	0.73
Media thickness (mm)	0.20 ± 0.05	0.18 ± 0.04	0.29
Intima-media thickness (mm)	0.25 ± 0.05	0.24 ± 0.04	0.39
Diameter (mm)	1.9 ± 0.2	2.0 ± 0.4	0.05
RHI	1.8 ± 0.4	2.0 ± 0.6	0.07
F-RHI	0.21 ± 0.16	0.23 ± 0.16	0.61
RH_{max} (% of baseline at max dil)	1.9 ± 0.9	1.6 ± 0.7	0.095
$RH_{60\,s}$ (% of baseline at 60 s post-occlusion)	1.7 ± 1.0	1.3 ± 0.6	0.056
$AUC_{0-1\,min}$	0.6 ± 0.3	0.5 ± 0.2	0.23
$AUC_{0-3\,min}$	3.8 ± 1.9	3.2 ± 1.4	0.07
$AUC_{0-5\,min}$	6.5 ± 2.9	5.5 ± 2.3	0.11

Dangardt F et al., Atherosclerosis 2010;212:580-585

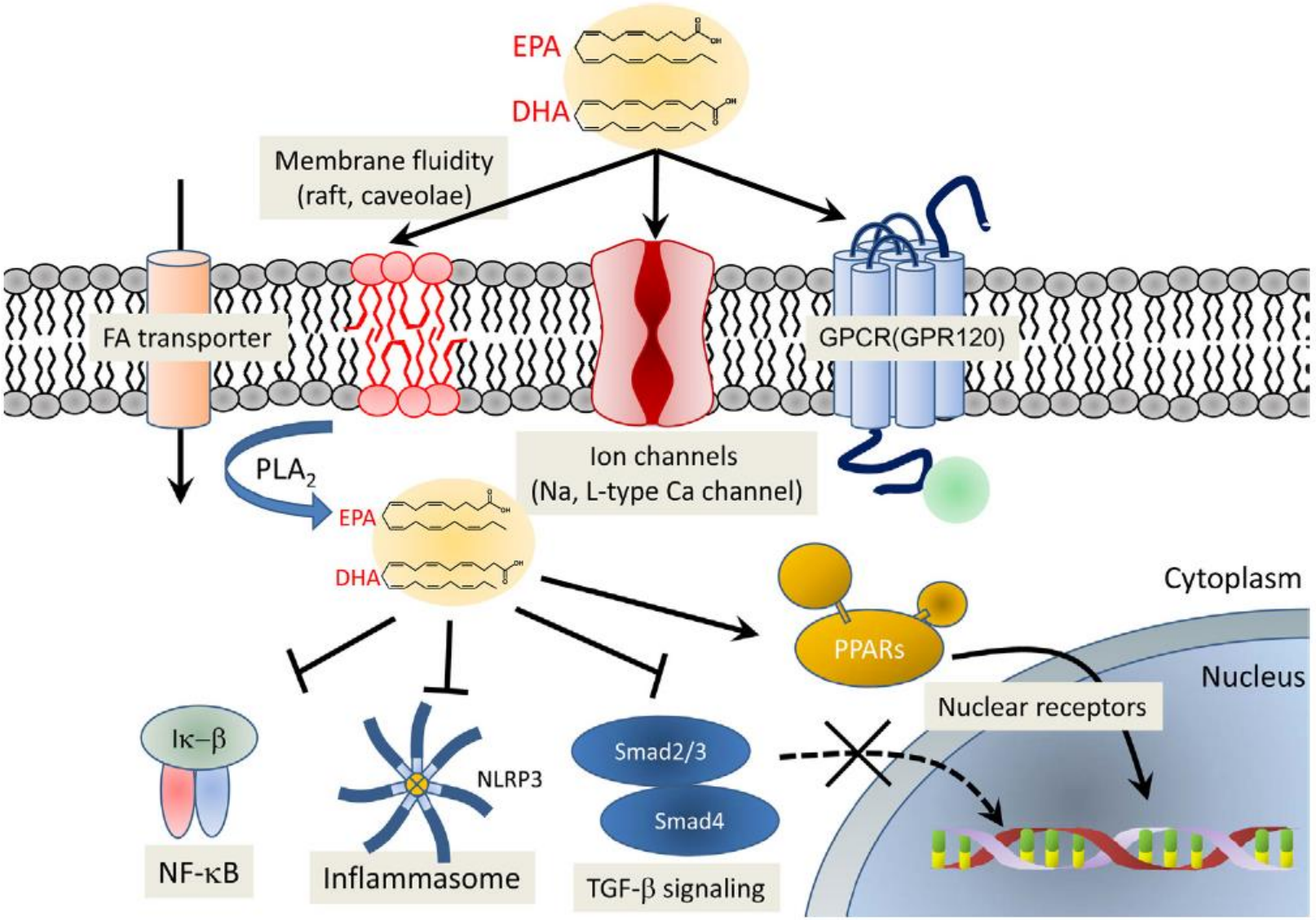
Omega-3 has anti-inflammatory effects

	Omega-3		Placebo		*p*
	Baseline	After 3-month treatment	Baseline	After 3-month treatment	
WBC (10^9/L)	7.4 ± 1.1	6.9 ± 1.3	7.1 ± 2.0	7.1 ± 1.4	0.50
Neutrophils (10^9/L)	3.8 ± 0.9	3.6 ± 1.0	3.6 ± 1.1	3.9 ± 1.0	0.19
Lymphocytes (10^9/L)	2.7 ± 0.7	2.5 ± 0.6	2.5 ± 0.6	2.5 ± 0.7	0.037
Monocytes (10^9/L)	0.61 ± 0.14	0.54 ± 0.13	0.53 ± 0.16	0.57 ± 0.16	0.021
sICAM-1 (pg/mL)	N/A	0.68 ± 0.53	N/A	0.91 ± 0.76	0.24
sVCAM-1 (pg/mL)	N/A	2.2 ± 2.0	N/A	1.3 ± 1.2	0.016
CRP (pg/mL)	N/A	1.06 ± 0.92	N/A	1.11 ± 0.71	0.87
GM-CSF (pg/mL)	N/A	0.46 ± 0.28	N/A	0.46 ± 0.21	0.91
IFN-γ (pg/mL)	N/A	0.70 ± 0.28	N/A	0.75 ± 0.23	0.55
TNF-α (pg/mL)	N/A	5.2 ± 1.0	N/A	5.7 ± 1.5	0.008
IL-1β (pg/mL)	N/A	0.18 ± 0.02	N/A	0.40 ± 0.32	0.023
IL-2 (pg/mL)	N/A	1.3 ± 0.9	N/A	1.0 ± 0.8	0.004
IL-6 (pg/mL)	N/A	1.8 ± 0.5	N/A	2.1 ± 0.8	0.035
IL-8 (pg/mL)	N/A	2.2 ± 0.8	N/A	2.5 ± 0.7	0.17
IL-10 (pg/mL)	N/A	2.0 ± 1.1	N/A	2.0 ± 1.2	0.88
IL-12 p70 (pg/mL)	N/A	2.6 ± 1.2	N/A	2.6 ± 1.4	0.84
SAA (pg/mL)	N/A	2.2 ± 1.5	N/A	2.1 ± 1.8	0.44

Subjects: obese adolescents
Intervention: Omega-3 1.2 g/days for 3 months

Dangardt F et al., Atherosclerosis 2010;212:580-585

Molecular mechanisms of cardioprotection of Omega-3



Endo J et al., J Cardiol 2016;67:22-27

結果與安慰劑組相比無差異

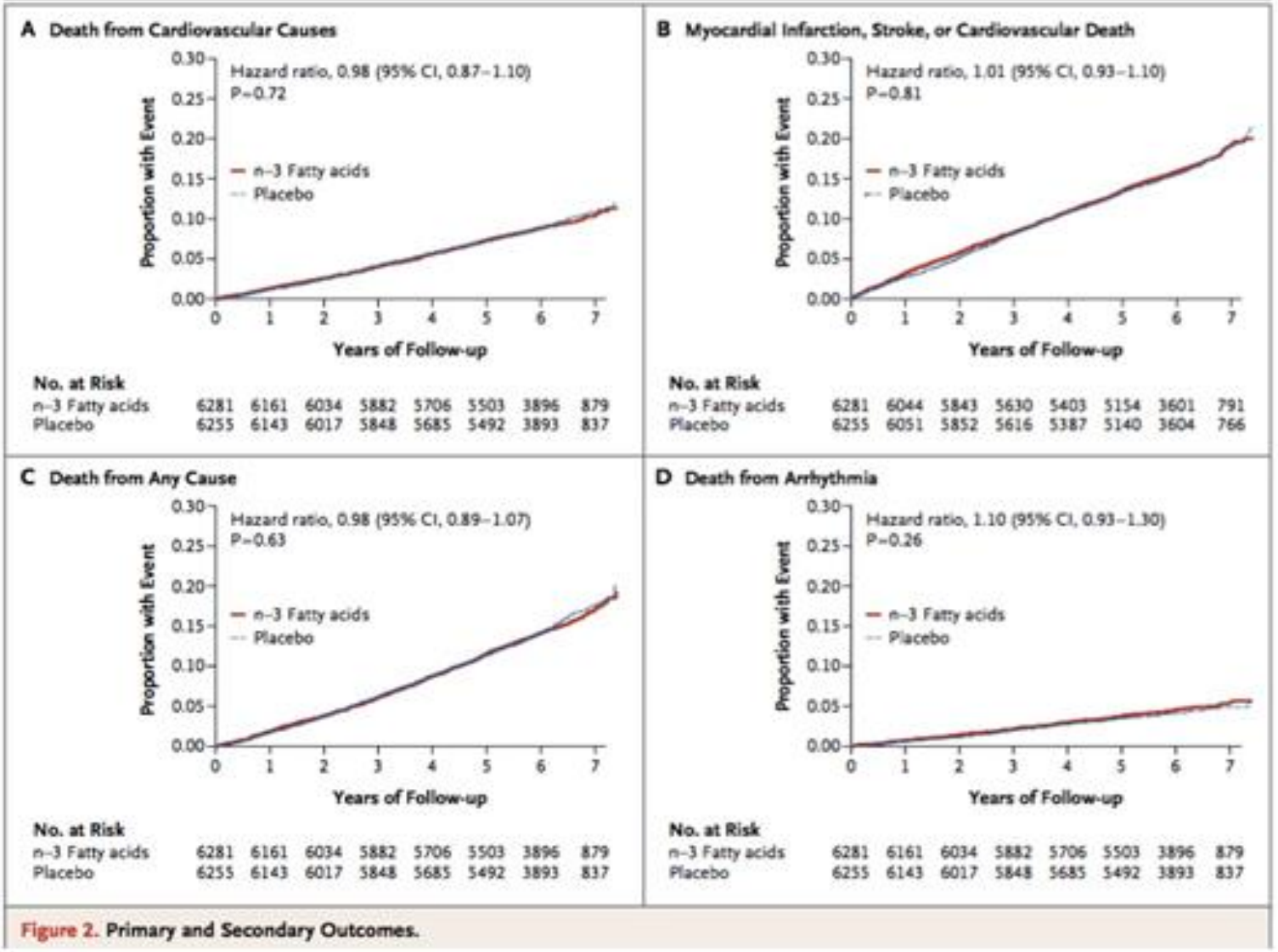
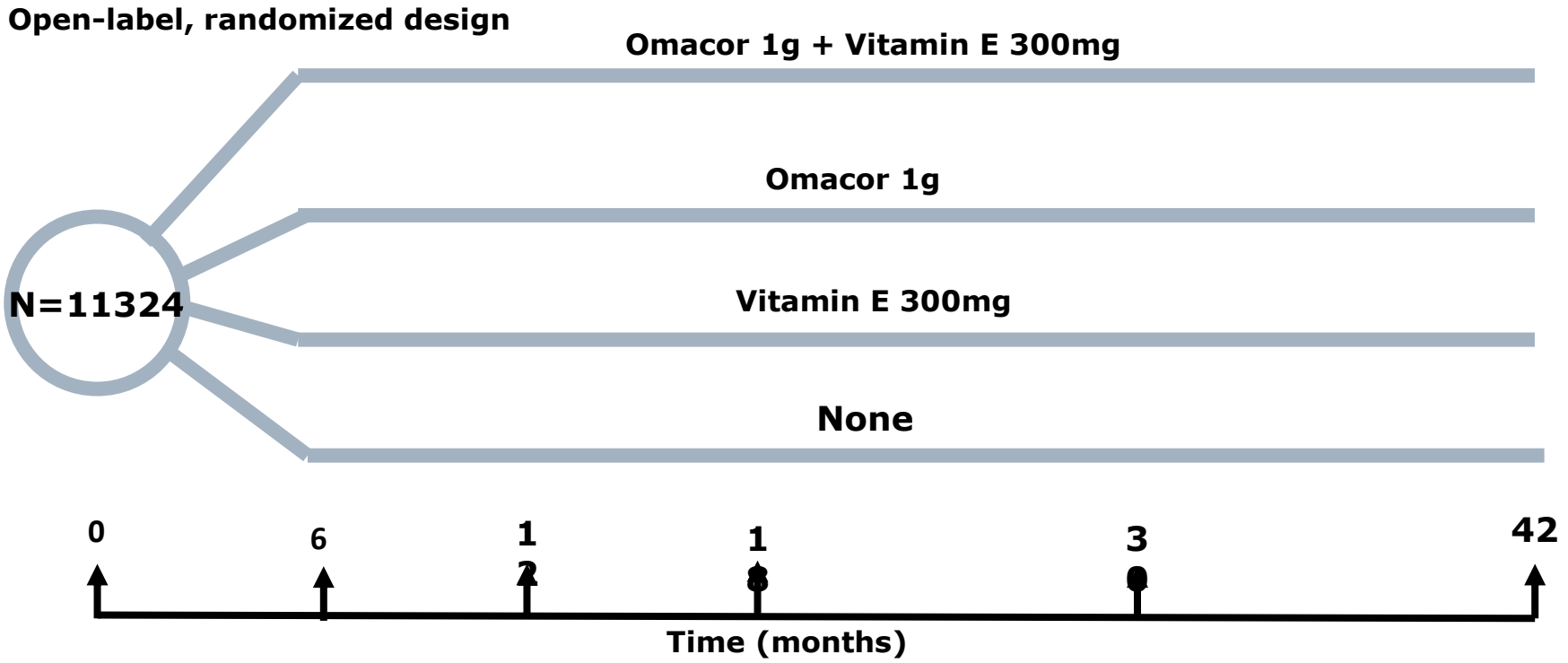


Figure 2. Primary and Secondary Outcomes.

GISSI-Preventione trial

Recent MI (≤ 3 mo; median, 16d)

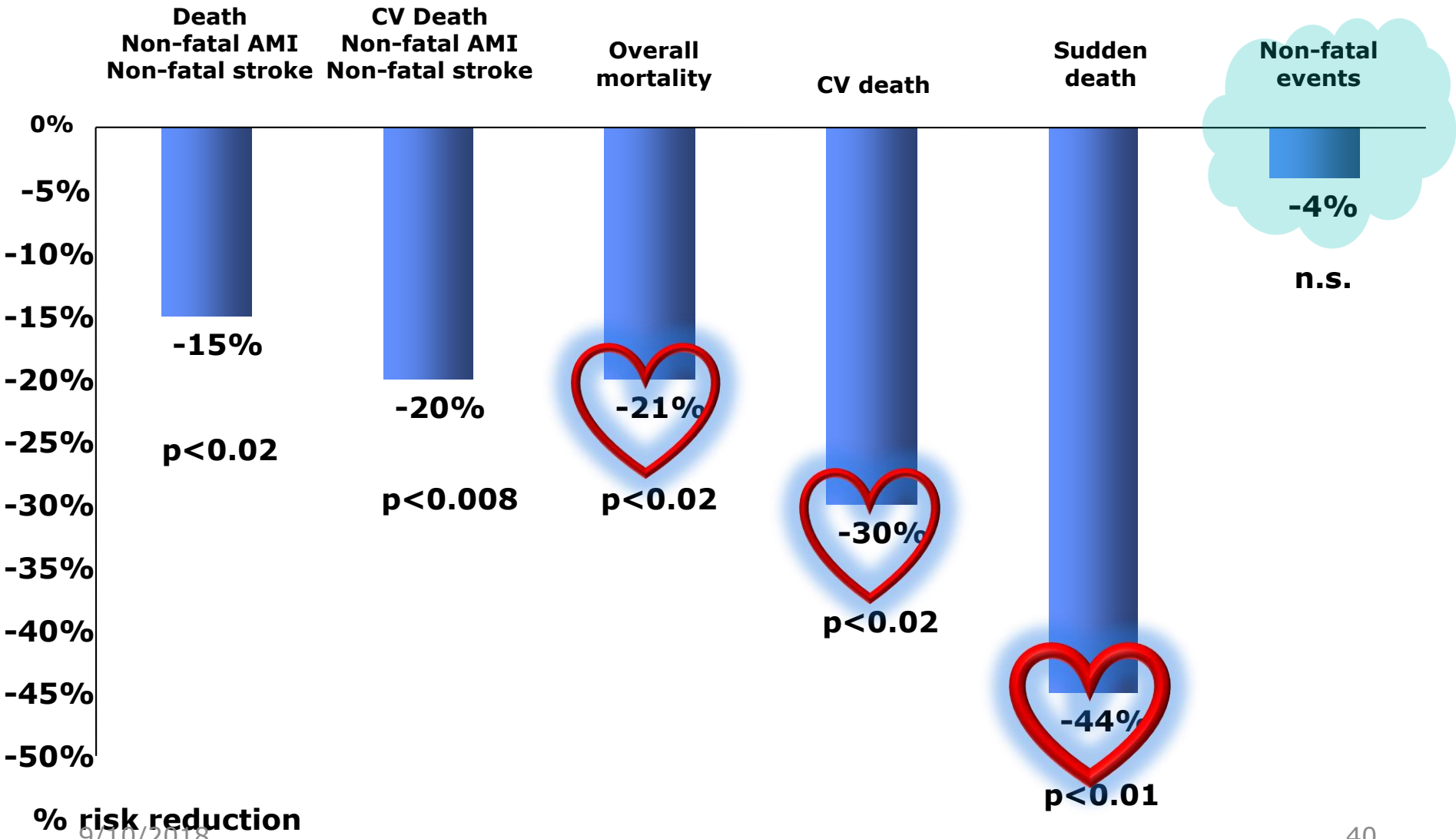


Dietary supplementation with n-3 polyunsaturated fatty acids and vitamin E **after myocardial infarction**: results of the GISSI-Prevenzione trial

Gruppo Italiano per lo Studio della Sopravvivenza nell'Infarto miocardico

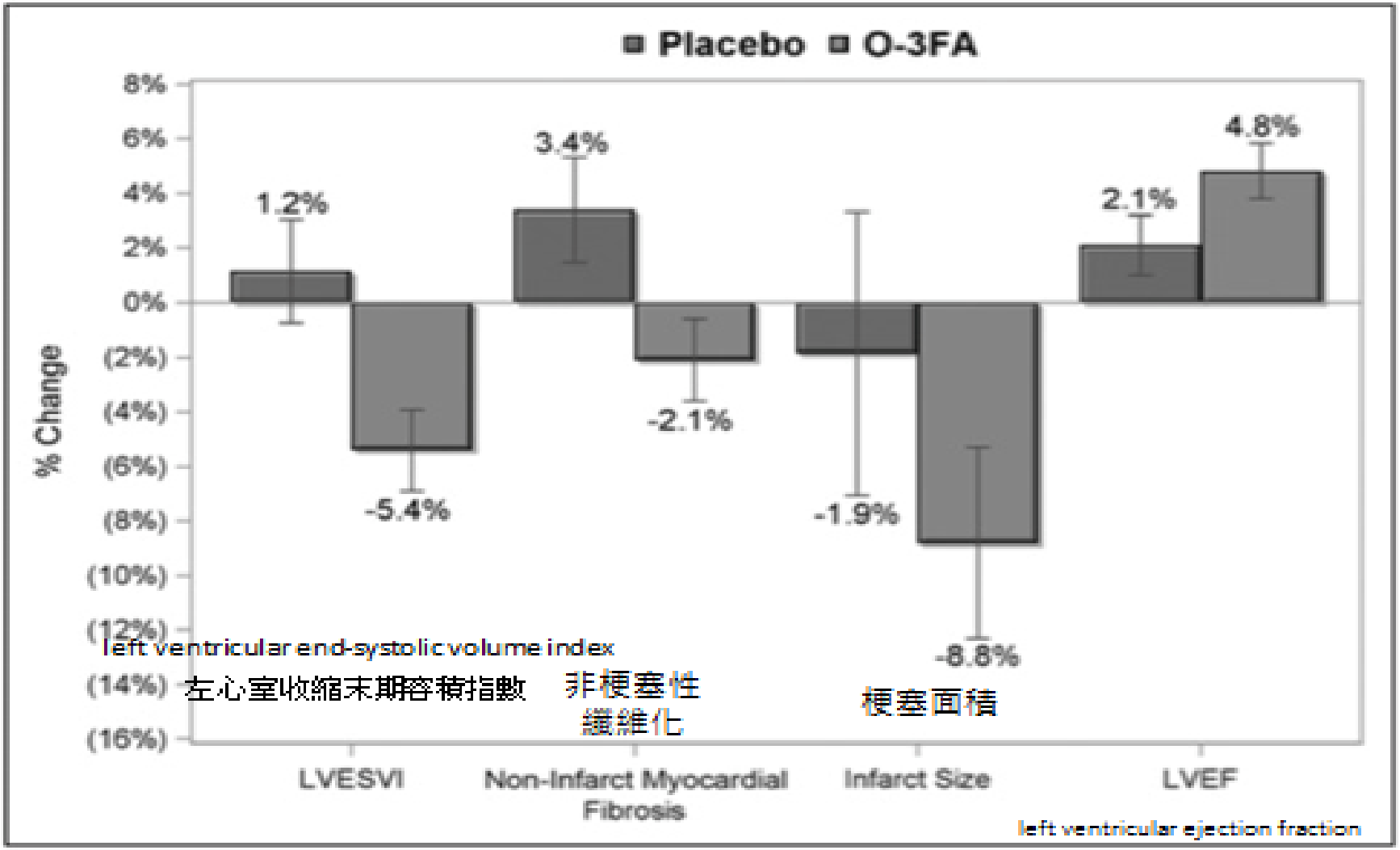
Lancet. 1999 Aug 7;354(9177):447-55

Effect of n-3 PUFA treatment in GISSI-Prevenzione (11,323 post-MI pts)



(GISSI-Prevenzione Investigators, Lancet 1999; 354:447)

此篇研究發現Omacor能讓急性心肌梗塞患者避免心臟結構惡化及無力！！！



Circulation. 2016;134:378–391.

GISSI–HF (Gruppo Italiano per lo Studio della Sopravvivenza nell'Infarto Miocardico–Heart Failure)

- GISSI–HF project:

  A large-scale, randomized, double-blind study designed to investigate the effects of omega-3 fatty acids and statin therapy on mortality and morbidity in patients with CHF (NYHA class 2–4 regardless of cause and LVEF)

- Treatments in the two separate substudies:

GISSI–HF, PUFA study	GISSI–HF statin
n-3 PUFA 1 g daily or placebo	Rosuvastatin 10 mg or placebo

- Co–primary end points:

  Death and death or admission to the hospital for CV reasons

GISSI–HF: Results

At follow-up of 3.9 years

L Tavazzi (Fondazione IRCCS Policlinico San Matteo, Pavia, Italy)
European Society of Cardiology 2008 Congress

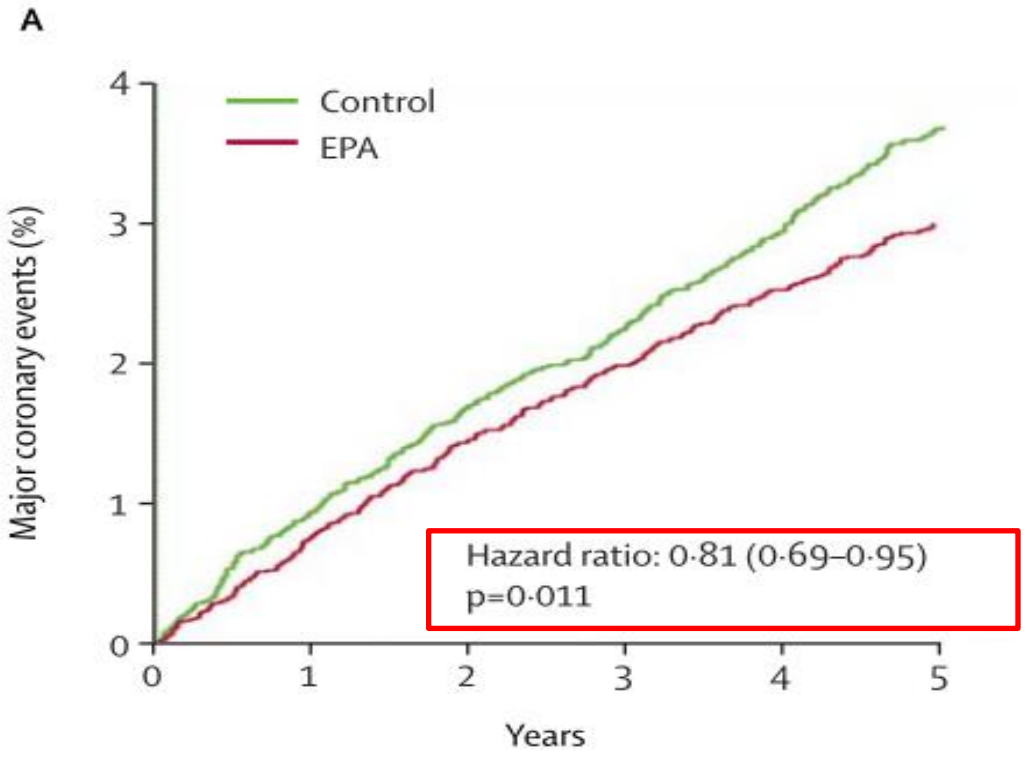
GISSI–HF PUFA: Primary and secondary outcomes[a]

End point	Omega-3 fatty acids (n=3494), %	Placebo (n=3481), %	Adjusted hazard ratio (95% CI)
Primary end points			
Mortality	27.3	29.1	0.91 (0.833–0.998)
All-cause mortality or hospitalization for CV causes	56.7	59.0	0.92 (0.849–0.999)
Secondary end points			
Death from CV causes	20.4	22.0	0.90 (0.81–0.99)
Sudden cardiac death	8.8	9.3	0.93 (0.79–1.08)
Patients admitted for CV causes	46.8	48.5	0.93 (0.87–0.99)
Patients with fatal and nonfatal MI	3.1	3.7	0.82 (0.63–1.06)
Patients with fatal and nonfatal stroke	3.5	3.0	1.16 (0.91–1.53)

Lancet 2008; 372: 1223–30

Effects of eicosapentaenoic acid on major coronary events in hypercholesterolaemic patients (JELIS): a randomised open-label, blinded endpoint analysis

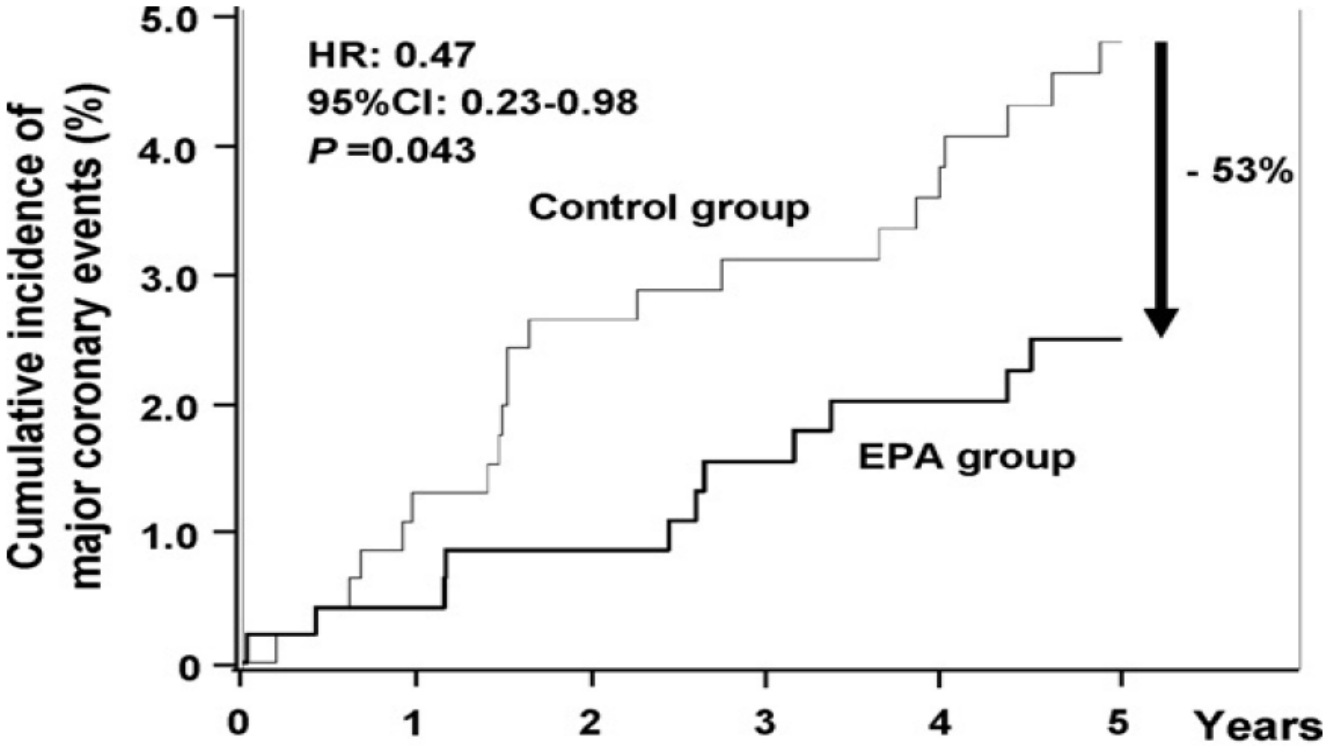
80% 1st primary prevention



- **EPA ethyl ester 1.8 g/day** plus low-dose pravastatin or simvastatin versus statin alone in hypercholesterolemic patients with or without CHD
- A total of 18,645 patients (**primary prevention cohort, 14,981 patients; secondary prevention cohort, 3,664 patients**).

Lancet 2007; 369: 1090–98

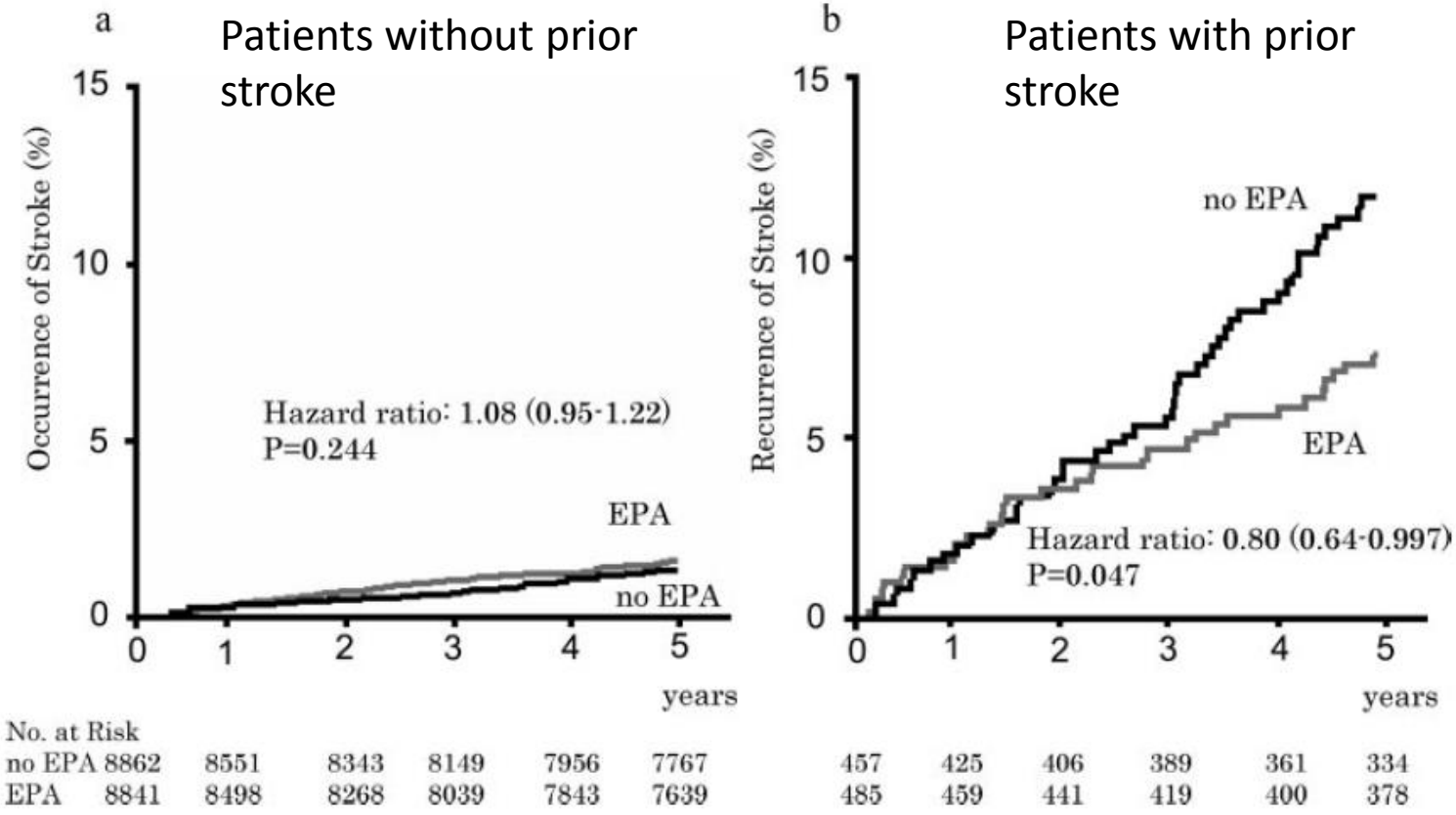
Effects of EPA on the incidence of MCE for the TG >150 and HDL-C <40 in (JELIS)



Atherosclerosis 200 (2008) 135–140

In patients with ischemic stroke

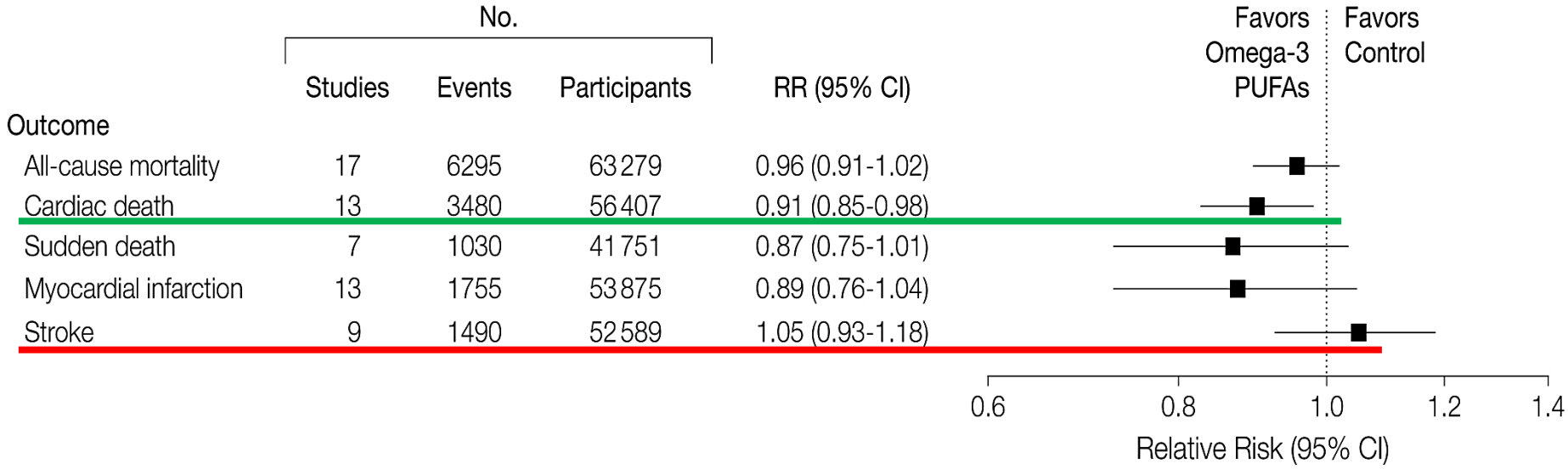
Post hoc analysis of JELIS trial



Tanak K et al., Stroke 2008;39:2052-2058

Association between omega-3 fatty acid supplementation and risk of major cardiovascular disease events: a systematic review and meta-analysis

20 studies of 68,680 patients were included, reporting 7044 deaths, 3993 cardiac deaths, 1150 sudden deaths, 1837 myocardial infarctions, and 1490 strokes.



JAMA 2012 Sep 12;308(10):1024-33. doi: 10.1001/2012.jama.11374.

美研究：阿斯匹靈無助預防心臟病

【本報綜合外電報導】以往認爲每天服用低劑量的阿斯匹靈，可以降低心臟病與中風等機率。根據美聯社報導，一項美國研究發現，阿斯匹靈無法預防中度風險者發生第一次中風或心臟病。另一項英國研究測試阿斯匹靈針對糖尿病患者的影響，發現阿斯匹靈的好處被出血風險給抵消。另外，英國研究中也測試了補充omega-3脂肪酸的成效，結果也發現沒有助益。

一項由美國波士頓布里翰婦女醫院（Brigham and Women's Hospital）領導的研究，讓一萬二千五百四十六人分爲二組，分別服用阿斯匹靈以及安慰劑，這些民衆有中度心臟病或中風的風險，可能在十年內病發。

服用五年後，兩組人都各有百分之四出現心臟問題，差異遠低於預期。領導這項研究的醫師嘉基安諾（J. Michael Gaziano）說，阿斯匹靈沒有什麼機會幫上忙。

另外，研究發現服用阿斯匹靈的一組，有百分之一出現腸胃出血，比率是服用安慰劑組的二倍。服用阿斯匹靈服者也有較多鼻出血、消化不良、胃食道逆流或腹痛問題。研究成果發表於英國醫學期刊《刺胳針》（Lancet）。

另一項英國的研究，牛津大學人員，將一萬五千四百八十名第一型或第二型糖尿病患者，隨機分配成四組，按組別每天服用阿斯匹靈、一公克魚油（omega-3脂肪酸）、阿斯匹靈與魚油兩種都吃、安慰劑四種方式。

七年半後，阿斯匹靈服用者出現心臟問題的案例減少，但卻出現較多的嚴重出血病例，因此大致上只是把一個風險換成另一個。這項研究也測試了omega-3脂肪酸，補充劑攝取者的與服用安慰劑者接近，每組人各有百分之九有心臟問題。研究結果發表於《新英格蘭醫學期刊》（New England Journal of Medicine）。

英國牛津大學研究領導人鮑曼（Louise Bowman）醫師說：「我們很有信心認爲，魚油補充劑似乎無法預防心臟病。」

Omega-3 Polyunsaturated Fatty Acid (Fish Oil) Supplementation and the Prevention of Clinical Cardiovascular Disease

A Science Advisory From the American Heart Association

Indication (Population)	Recommendation	Class (Strength) of Recommendation	Level (Quality) of Evidence	Comments
Primary prevention of CHD (general population [without CHD])	No recommendation	…	…	One RCT in participants from the general population (VITAL) is ongoing.
Prevention of CVD mortality in diabetes mellitus/prediabetes	Treatment is not indicated	III*	B-R	Based on 1 large RCT (ORIGIN) in patients with diabetes mellitus or prediabetes. One RCT in diabetic patients (ASCEND) is ongoing.
Prevention of CHD among patients at high CVD risk (mixed populations with and without CHD)	Treatment is not indicated	III*†	B-R	Of 4 large RCTs, 3 (ORIGIN, R & P, AREDS2) did not show benefit (although they were individually underpowered to show differences in cardiac death), and 1 open-label RCT (JELIS) showed a benefit in total CVD events resulting from reduction in nonhard cardiovascular end points (angina, revascularizations).

Circulation. 2017;135:00–00. DOI: 10.1161/CIR.0000000000000482

Secondary prevention of CHD and SCD among patients with prevalent CHD	Treatment is reasonable	IIa†	A	Of 2 large RCTs, 1 (GISSI-Prevenzione) showed benefit and 1 (Alpha Omega) did not. Of 3 small RCTs, 1 (DART) showed benefit and 2 (OMEGA, SU.FOL.OM3) did not. Meta-analysis (Rizos et al[11]) yields a significant risk ratio for cardiac death of 0.9.
Primary prevention of stroke (high CVD risk [with or without prevalent CHD])	Treatment is not indicated	III*	B-R	Based on meta-analysis of RCTs with stroke as a secondary outcome (Rizos et al[11]). No RCTs have been performed with stroke as primary outcome.
Secondary prevention of stroke	No recommendation	…	…	No RCTs performed.
Primary prevention of heart failure	No recommendation	…	…	No RCTs performed.
Secondary prevention of outcomes in patients with heart failure	Treatment is reasonable	IIa	B-R	Based on 1 large RCT (GISSI-HF) in patients receiving current state-of-the-art heart failure care.
Primary prevention of AF	No recommendation	…	…	No RCTs performed.
Secondary prevention of AF in patients with prior AF	Treatment is not indicated	III*	A	Based on several RCTs.
AF after cardiac surgery	Treatment is not indicated	III*	A	Based on 1 large RCT (OPERA) and a meta-analysis of all existing RCTs.

Circulation. 2017;135:00–00. DOI: 10.1161/CIR.0000000000000482

2017 Taiwan lipid guidelines for high risk patients☆

Omega-3 fatty acids	Omega-3 fatty acids 2—4 g	LDL ↓6%—↑25% HDL ↓5%—↑7% TG ↓ 20—45% Non-HDL↓ 5—14%	Fishy smell Skin eruption	Combination with statin improve postprandial TG level

Recommendation

- Omega-3 fatty acid is indicated for the treatment of very high TG (≥500 mg/dL). (COR IIa, LOE B)
- EPA and DHA are recommended for patients with coronary heart disease and hypertriglyceridemia. (COR IIa, LOE B)

Journal of the Formosan Medical Association (2016) xx, 1e32

Take hOme message

=

50克的鯷魚(祕魯近海小型鯷魚)

首頁 » 歐洲食品 » 義大利Delicius—油漬鯷魚罐頭

義大利Delicius—油漬鯷魚罐頭

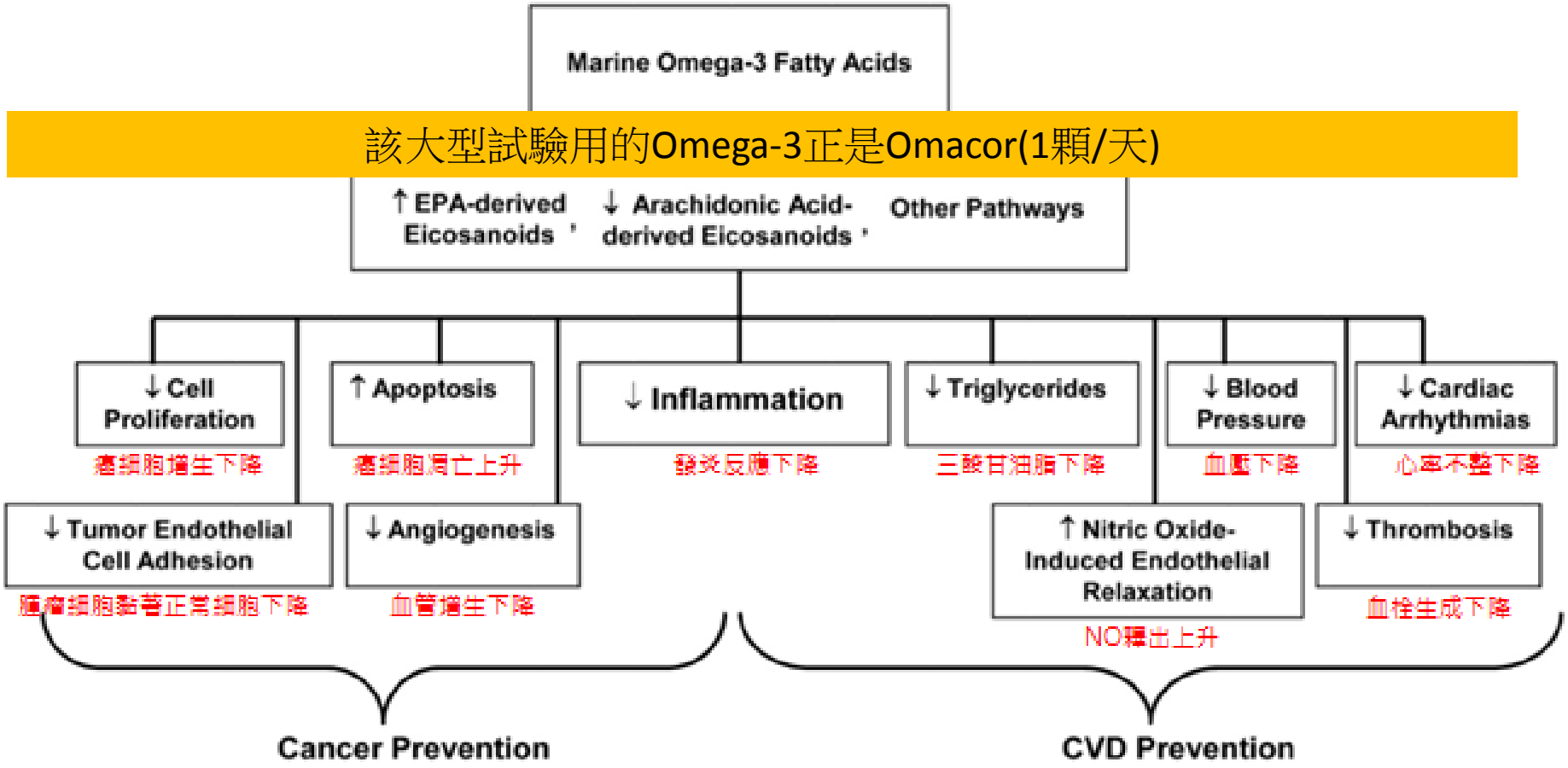
價格：NT$165元

重量：46g
保存方式：陰涼處存放，開封後冷藏

放入購物車

數量：1

Omega-3在過往動物實驗與小型臨床試驗已看到對於心血管疾病及癌症預防可能有幫助



Redf : NIH(The VITamin D and OmegA-3 TriaL (VITAL)) Contemp Clin Trials. 2012 January ; 33(1): 159–171.

OMACOR適合推薦給哪些患者?

- 已經吃了Fibrate但TG仍超過500的患者
- 不能使用Fibrate的患者
- 高風險族群(已使用Statin但TG仍超過200的患者)
- 不符合健保規範或是不想吃傳統西藥來降TG的患者
- CHD/HF患者(國內外治療指引推薦)
- IGA腎炎(KADIGO治療指引推薦)
- 憂鬱症(美國治療指引建議)
- 乾眼症(美國治療指引推薦)
- 關節炎(澳洲風濕免疫協會建議)
- 亞健康患者，習慣購買食品魚油保養的患者(預防老人痴呆 ；CVD；癌症)

南基醫院

Omega-3降TG機轉

- 第一,我們**肝臟**自己會合成三酸甘油脂,因為三酸甘油脂不只會從油脂來,也會從**糖分和酒精轉換**而來,怎麼轉化,主要就是透過肝臟裡面的甘油西基轉移酶,這個酶會將血液裡面的游離脂肪酸和甘油合成三酸甘油脂,再藉由VLDL帶到血液中,而**Omega-3**會阻斷掉甘油西基轉移酶的作用,降低肝臟的合成
- 第二,血液中，**Lipoprotein Lipase**會把滿載三酸甘油脂的VLDL降解成LDL，而LDL會再把剩餘的三酸甘油脂(也包含膽固醇但這裡不用提)送回肝臟。 而Omega-3會促進Lipoprotein Lipase作用，加速VLDL的分解。 **所以Omega-3一方面抑制TG的合成,二方面促進VLDL的代謝**