Heart Healthy

IET

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Heart facts

- Coronary heart disease is the second biggest killer of South Africans after HIV/Aids
- Each day 33 South Africans die from a heart attack, 60 die from a stroke
- 60% of Coronary heart disease are due to high cholesterol

The role of diet

- 60% of CHD deaths in developing countries are due to high cholesterol. BHF website
- The cornerstone of therapy for CHD is its prevention through the modification of ***risk factors***
- Other healthy lifestyle behaviors together with a healthy eating pattern and moderate alcohol consumption, are associated with a 95% decrease in heart attack risk .

Akesson A, Weismayer C, Newby PK, et al. Combined effect of low-risk dietary and lifestyle behaviors in primary prevention of myocardial infarction in women. Arch Intern Med 2007;167(19):2122–7.

Selected dietary intervention trials with coronary heart disease (CHD) morbidity or mortality or both as endpoints[1]

Study	Subjects		Study characteristics			Percentage change in TC from baseline[2]	Comments
	n	Age	Design	Randomized	Duration		
		y			*y*	%	
Finnish Mental Hospital (180–182)[3]	5115 M + F 5497 M + F	>15	Crossover	No	6	−12 to 18	53% decrease in CHD mortality in men ($P < 0.002$), with a 34% decrease in women (NS).
Oslo Diet-Heart (183)	412 M with CHD	30–64	Unblinded	Yes	5	−14	33% decrease in MI ($P < 0.05$). 26% decrease in CHD mortality (NS).
Los Angeles VA (184)	846 M	50–89	Double-blinded	Yes	5–8	−13	31% decrease in the endpoints of MI, CHD mortality, CVA, ruptured aneurysm, and ischemic gangrene ($P < 0.01$); 20% decrease in primary endpoints of MI and sudden death (NS).
Minnesota Mental Hospital (185)	9057 M + F	All	Double-blinded	Yes	<4.5	−14	No significant differences or trends were noted in MI or sudden death.
DART (186)	2033 M	<70	Factorial	Yes	2	−2.8[4]	29% decrease in 2-y all-cause mortality in CHD subjects advised to eat fish ($P < 0.05$) as a result of 33% decrease in CHD mortality ($P < 0.01$).
Lyon Diet Heart (187, 188)	605 M + F with CHD	<70	Single-blinded	Yes	5	−7.5	65% decrease in CHD mortality in post-MI patients fed an α-linolenic–rich diet ($P < 0.01$).
GISSI (189)	11 324 M + F with CHD	Not defined	Factorial	Yes	3.5	7–9	15% decrease in relative risk of all-cause death, nonfatal MI, and nonfatal stroke in the 2 groups supplemented with 1 g n−3 PUFA. No benefit was seen in the group given vitamin E.
HOPE (190, 191)	9541 M + F with CHD	≥55	Double-blinded	Yes	4–6	NR	400 mg vitamin E taken daily had no beneficial effects on cardiovascular outcomes in a high-risk patient population.

[1] CVA, cerebrovascular accident; DART, Diet and Reinfarction Trial; GISSI, Gruppo Italiano per lo Studio della Sopravivenza nell'Infarto miocardico; HOPE, Heart Outcomes Prevention Evaluation; MI, myocardial infarction; NR, not reported; PUFA, polyunsaturated fatty acids; TC, total cholesterol.

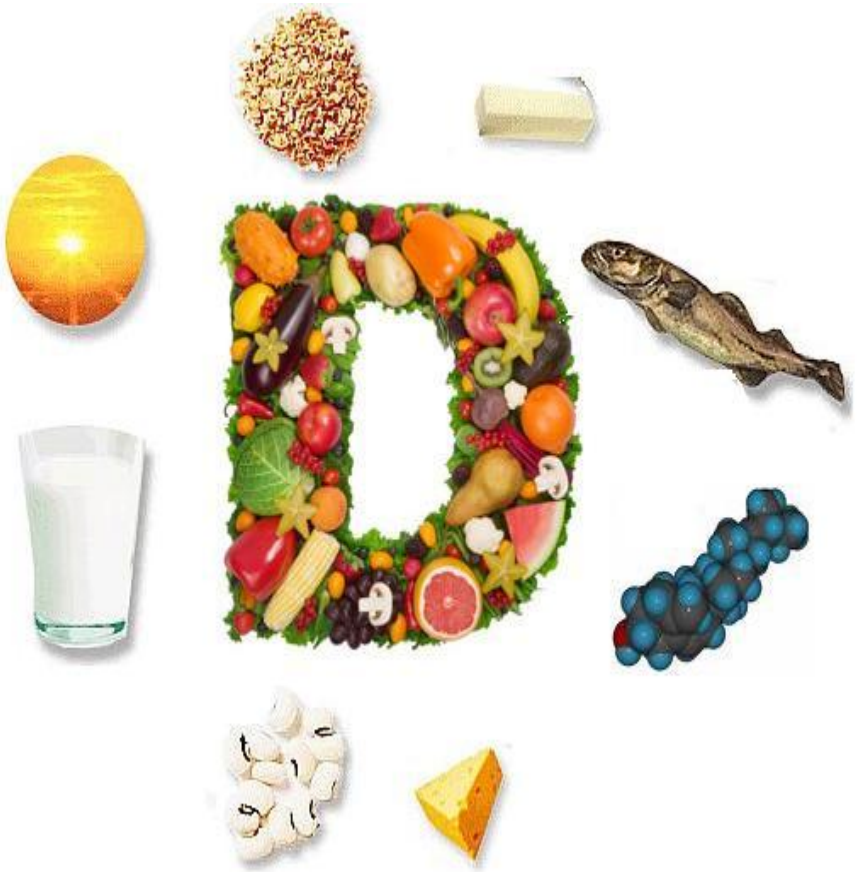
[2] The percentage change in plasma total, rather than LDL, cholesterol is reported because of the unavailability of the latter value in the early intervention trials.

[3] Values are for the periods of 1959–1965 and 1965–1971, respectively.

[4] Value represents decrease in those given fat advice only (NS). No changes from baseline were noted in either the fiber or fish advice groups.

He that takes medicine and neglects diet, wastes the skill of the physician

HOT TOPICS

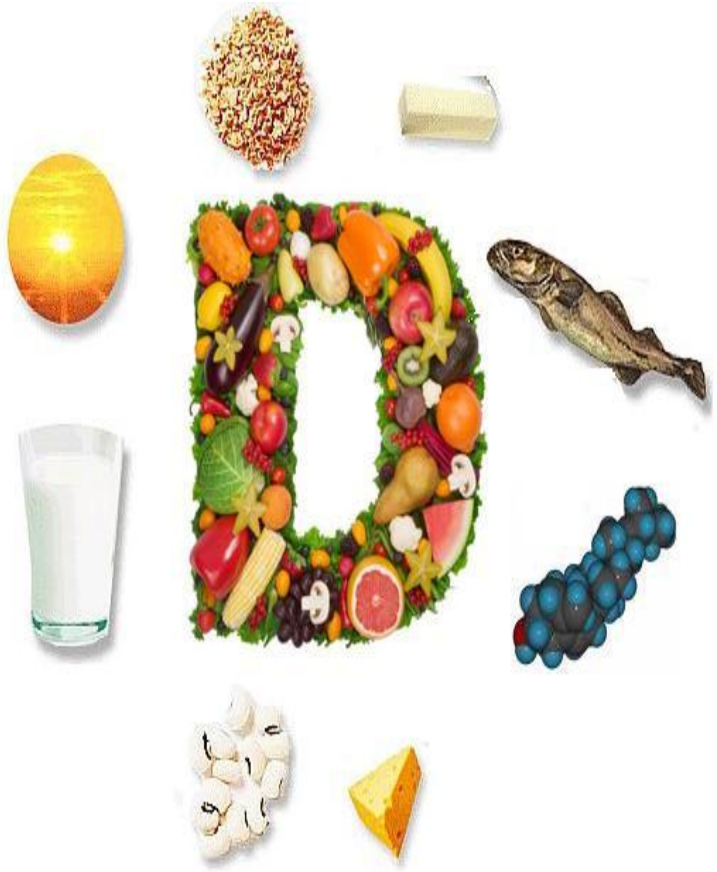


VITAMIN D

OMEGA 3 FATTY ACIDS

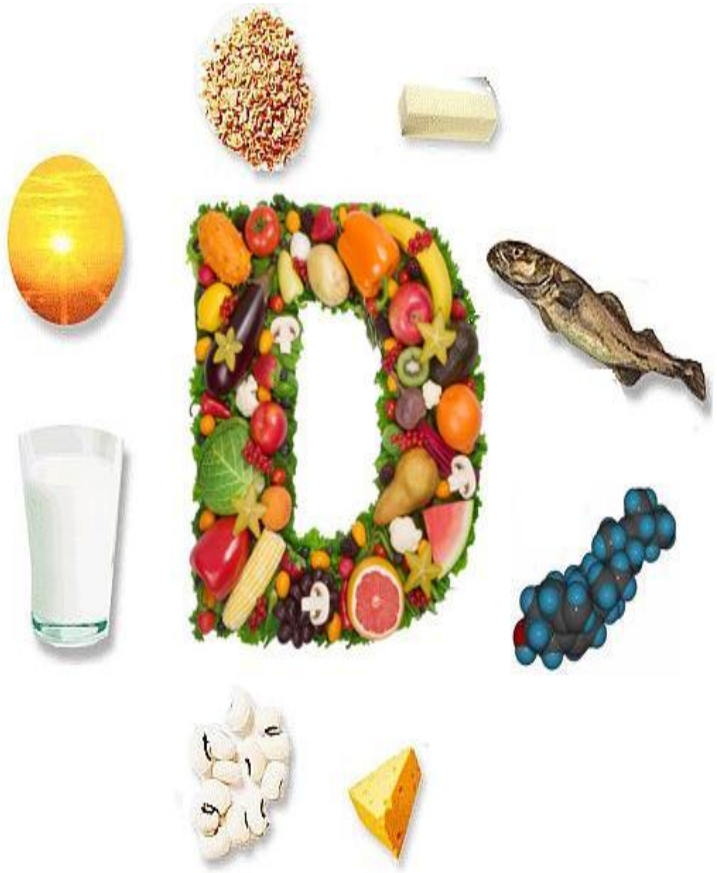
VITAMIN D

- Vitamin D is a fat-soluble vitamin that is naturally present in very few foods, added to others, and available as a dietary supplement.
- Produced endogenously when UV rays from sunlight strike the skin and trigger vitamin D synthesis.
- Vitamin D obtained from sun exposure, food, and supplements is biologically inert and must undergo two hydroxylations in the body for activation.



VITAMIN D - FUNCTIONS

- Promotes calcium absorption in the gut
- Modulation of cell growth,
- Neuromuscular and immune function, and reduction of inflammation
- Many cells have vitamin D receptors, and some convert 25(OH)D to 1,25(OH)2D Produced endogenously when UV rays from sunlight strike the skin and trigger vitamin D synthesis.



Vitamin D: Latest research

Non-skeletal diseases associated with hypovitaminosis D.

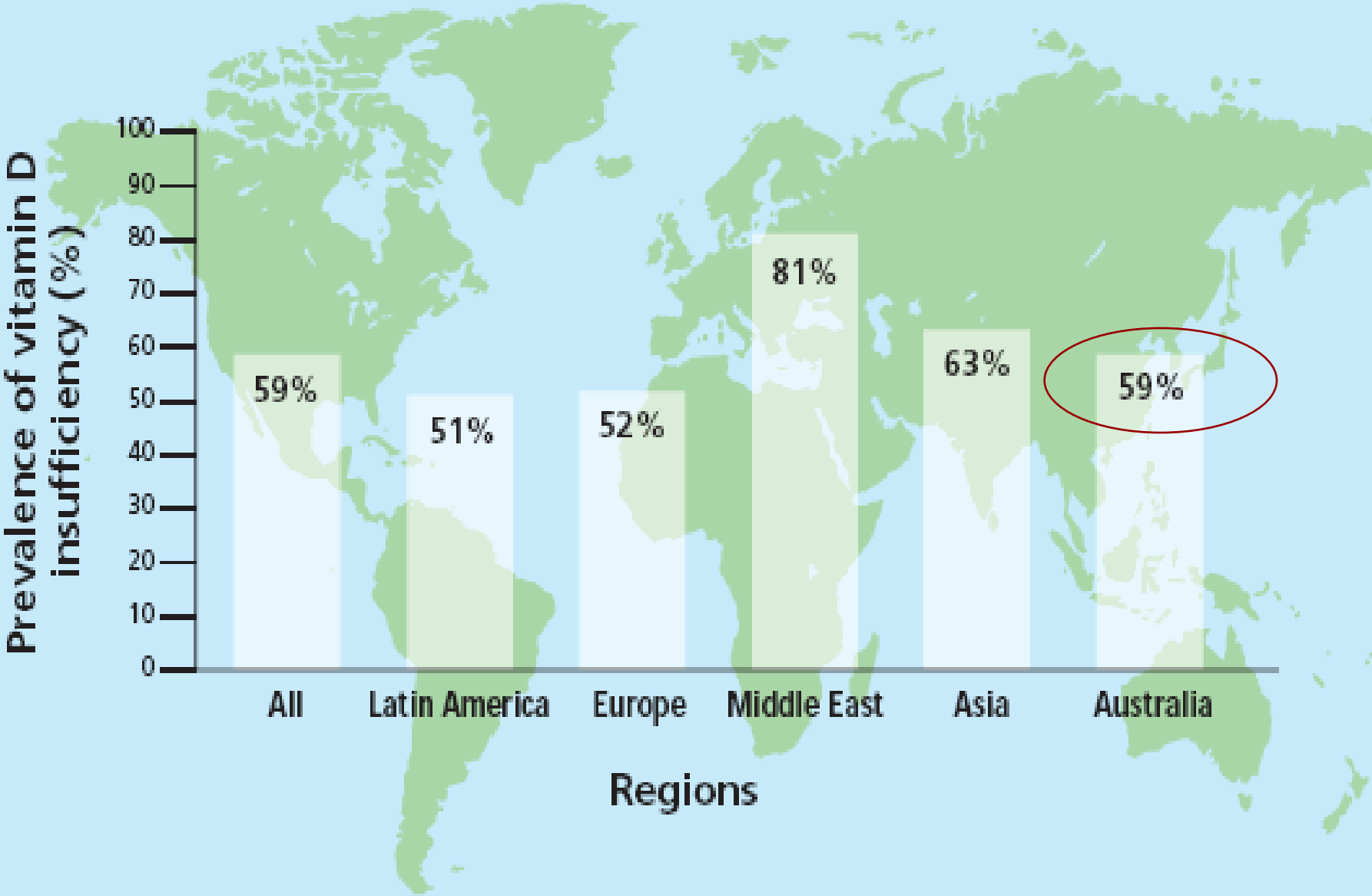
- All cause mortality
- Metabolic syndrome
- **Hypertension**
- Impaired glucose metabolism and type 2 diabetes
- **Dyslipidemia**
- **Cardiovascular diseases** (myocardial infarction, coronary insufficiency,
- coronary calcification, increased carotid intima median thickness)
- **Heart failure**
- **Peripheral arterial disease**
- Stroke
- Renal disease
- Autoimmune diseases (lupus erythematosus, multiple sclerosis, type 1 diabetes)
- Cancer (bowel, breast, prostate, non-Hodgkin lymphoma)
- Respiratory diseases (wheezing illness, autoimmune interstitial lung diseases)
- Liver fibrosis
- Psychiatric diseases (depression, autism, schizophrenia)

VIT D AND HEART DISEASE

- VITAMIN D MAY INFLUENCE CVD RISK
  - Influencing blood pressure
  - Diabetes
  - Dyslipidaemia
  - Parathyroid hormone (PTH) levels
  - Endothelial cell function & myocardial function
  - Inflammation
  - Ventricular hypertrophy
  - Vascular calcification

GENETICS

- A study from 2006 found that more than 170 genes in the coronary artery smooth muscle cells respond to 1,25(OH)2D. An inadequate level of circulating 25(OH) D may impair normal function of genes related to vitamin D, potentially leading to **increased risk of CVD.**



Global prevalence of low serum 25(OH)D levels (defined as < 30 ng/ml). Cross-sectional observational international study in 1,285 community-dwelling, postmenopausal women with osteoporosis, in 18 countries (from reference 9).

VITAMIN D DEFICIENCY

Independent cardiovascular disease (CVD) risk factor

- Vit D deficiency is currently regarded as an **independent cardiovascular disease (CVD) risk factor**
- High prevalence of vitamin D deficiency (74%) in patients with ***coronary artery disease and heart failure.***
- Vitamin D deficiency (<15 ng/mL) is associated with a **2-fold increased rate** of myocardial infarction over a 10-year period in healthy male professionals
- **Framingham Offspring study** Vitamin D deficiency (<15 ng/mL) Increased risk of
  - **myocardial infarction,**
  - **coronary insufficiency,**
  - **cerebrovascular events,**
  - **Claudication**
  - **Heart failure**

VITAMIN D DEFICIENCY

Independent cardiovascular disease (CVD) risk factor

- Vit D deficiency in ***Congestive Heart Failure*** is common and will triple risk of death from heart failure over 8 yrs
- LURIC study showed that Vitamin D deficiency is predictive of ***fatal strokes***
- Vit D deficiency linked to increased ***cardiovascular mortality***

Risk Factors towards Vitamin D deficiency

- High skin pigmentation 50-fold reduction,
- Elderly, Institutionalized or housebound
- Lack of sunlight exposure
  - Geographic location : Research indicate worldwide Vitamin D deficiency
  - Time of day and calendar season
- Present 10am to 3pm, blocked by ozone
- Sunscreen use, protective clothing
  - SPF **8** = **97.5%**
  - SPF **>15** = **99%**
- Obesity
- Renal & liver disease
- Multiple or short interval pregnancies
- Medications: Anticonvulsant, Rifampicin, Cholestyramine, Anti-retroviral usage

Pearce, Cheetham, BMJ 2010

Get yourself tested

- Vitamin D status: Serum 25-hydroxyvitamin D [25(OH)D_3] levels (most reliable)

Serum 25(OH)D concentration	Vitamin D status	Manifestation	Management
<20ng/mL (<25nmol/L)	Deficient	Even higher Increased risk of cardiovascular endpoints and mortality	Treat with oral Vitamin D 1800 – 4000IU per day
20-29ng/mL (25-50nmol/L)	Insufficiency	Increased risk of cardiovascular endpoints and mortality	Treat with oral Vitamin D 1800 – 4000IU per day
>30ng/mL (>50nmol/L)	Adequate	Lower risk of CVD and possibly other outcomes	Lifestyle advice & consider daily supplementation of 800 IU

Pearce, Cheetham, BMJ 2010

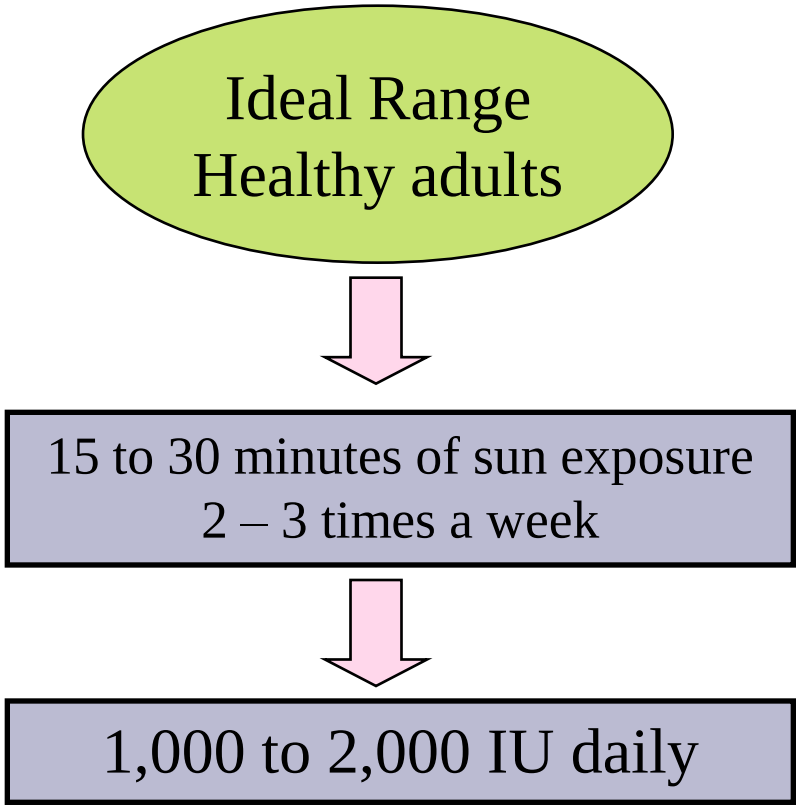
Sources of Vitamin D

- Ultraviolet B sunlight
  - Provides **>90%** of human supply
- Oily fish
- Cod liver oil & other fish oils
- Egg yolk
  - 20 IU per yolk
- Liver
- Mushrooms
- Supplemented breakfast cereals
  - Varies between 80-320 IU
- Margarine
- Fortified milk & infant formula

Pearce, Cheetham, BMJ 2010

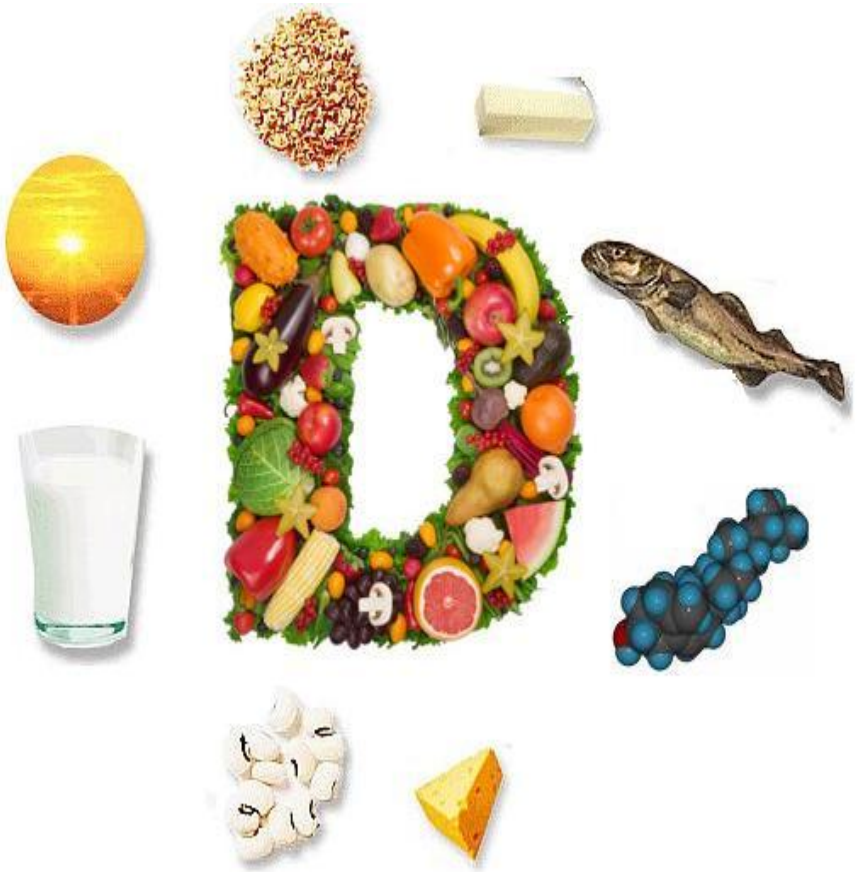
Vitamin D and Other Drugs

Little Miss Sunshine



- Keep in mind, however, that skin color, where you live and how much skin you have exposed all affect how much vitamin D you can produce.

HOT TOPICS



VITAMIN D

OMEGA 3 FATTY ACIDS

Metabolic Effects of Eicosanoids*

Omega 3 Series

- Vasodilatory
- Anti-inflammatory
- Anti-aggregatory
- Immunostimulant
- Anti-arrhythmic

Omega 6 Series

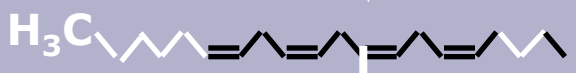
- Vasconstrictive
- Pro-inflammatory
- Pro-aggregatory
- Immunosuppressive
- Pro-arrhythmic

Essential Fatty Acid Families

Omega - 6 family

C18:2 ω-6 Linoleic

- **Corn Oil**
- **Safflower Oil**
- **Sunflower Oil**

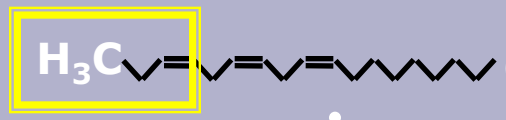


C20:4 ω-6 Arachidonic

More thrombotic and inflammatory metabolites

PROMOTES ARTHEROSCHLEROSIS &THROMBUS

Omega -3 family



C18:3 ω-3 α-Linolenic

- **Flaxseed Oil**
- **Canola Oil**
- **Soybean Oil**

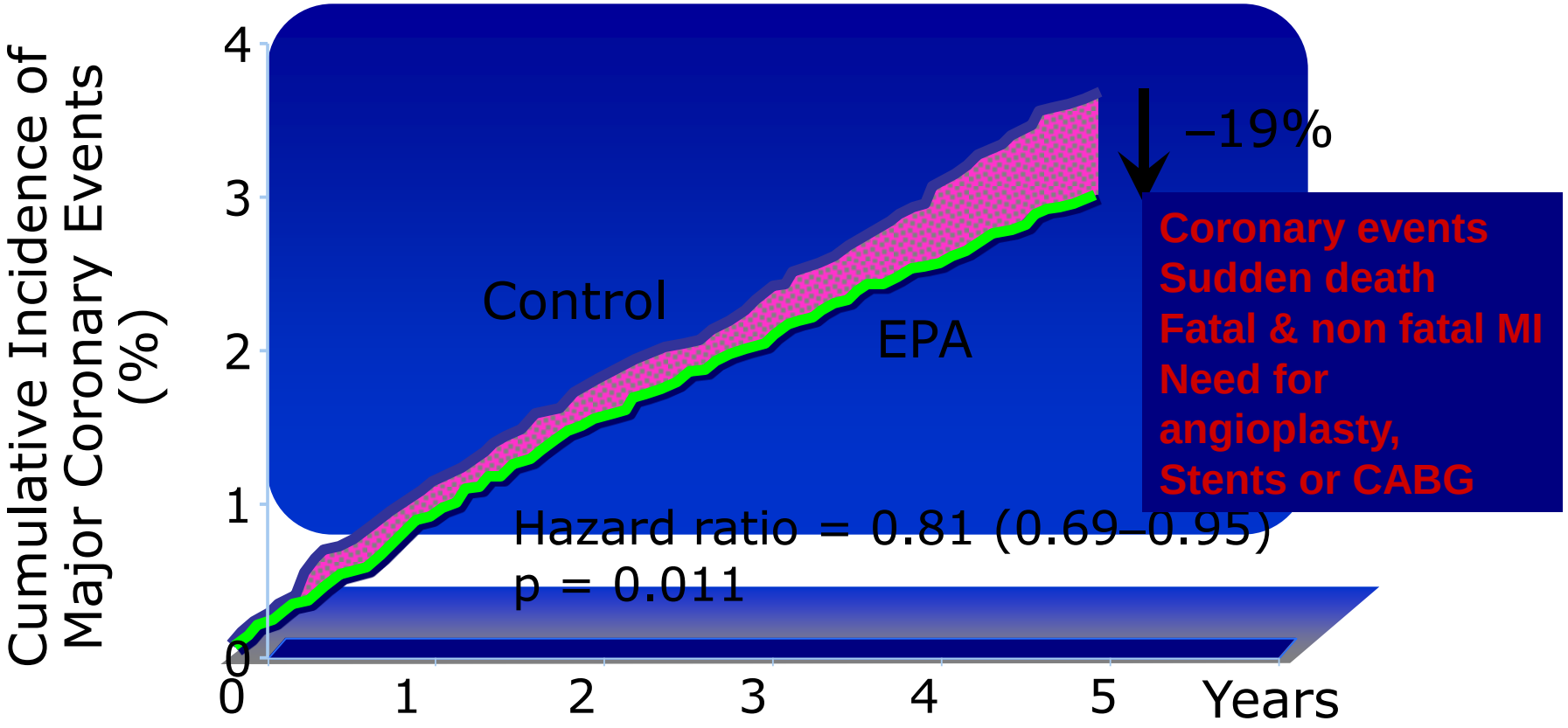
C20:5 ω-3 Eicosapentaenoic (EPA)

C22:6 ω-3 Docosahexaenoic (DHA)

Less thrombotic and inflammatory metabolites

- **Oily Fish**
- **Fish Oil Capsules**

Japan EPA Lipid Intervention Study (JELIS)

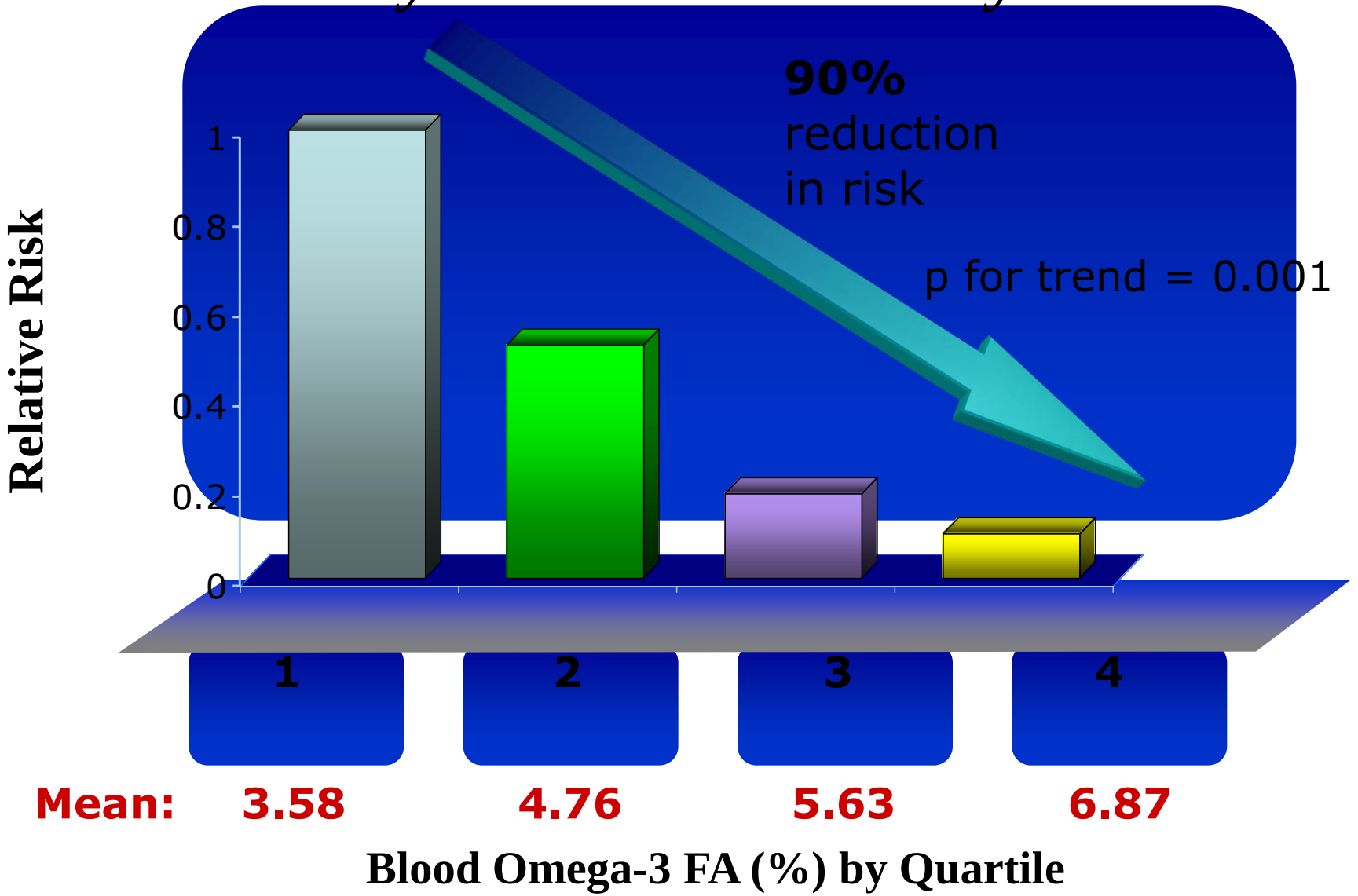


18,645 Japanese (70% women, mean age 61 years) randomized to statin alone or statin + EPA (1.8 g/d) and followed for 5 years

Yokoyama M. Presented at American Heart Association Scientific Sessions, Dallas, Texas, 14 November 2005.

Relative Risk of Sudden Cardiac Death and Blood Omega-3 Levels:

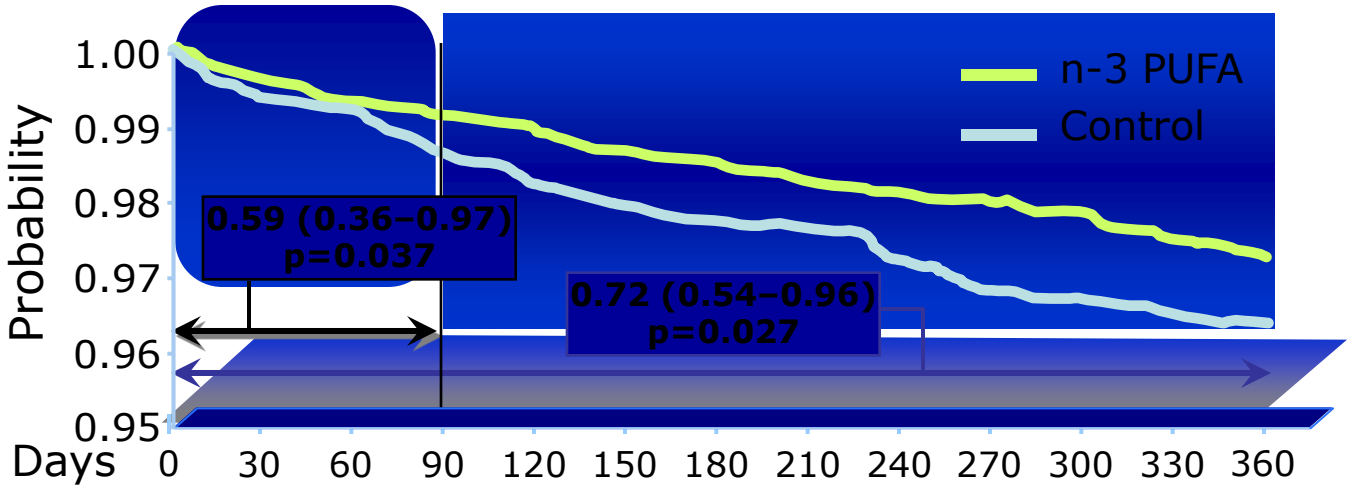
Physicians' Health Study



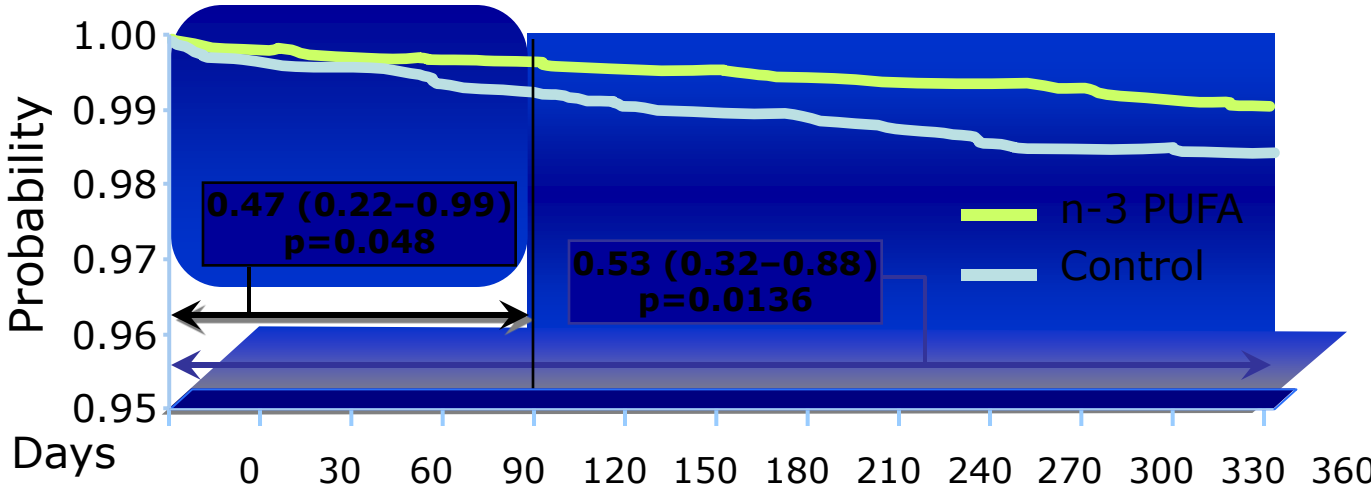
GISSI-Prevenzione:

>11,300 post-MI patients were given usual care with or without 850 mg EPA+DHA for 3.5 years

Total mortality reduced by 28% (p=0.027)



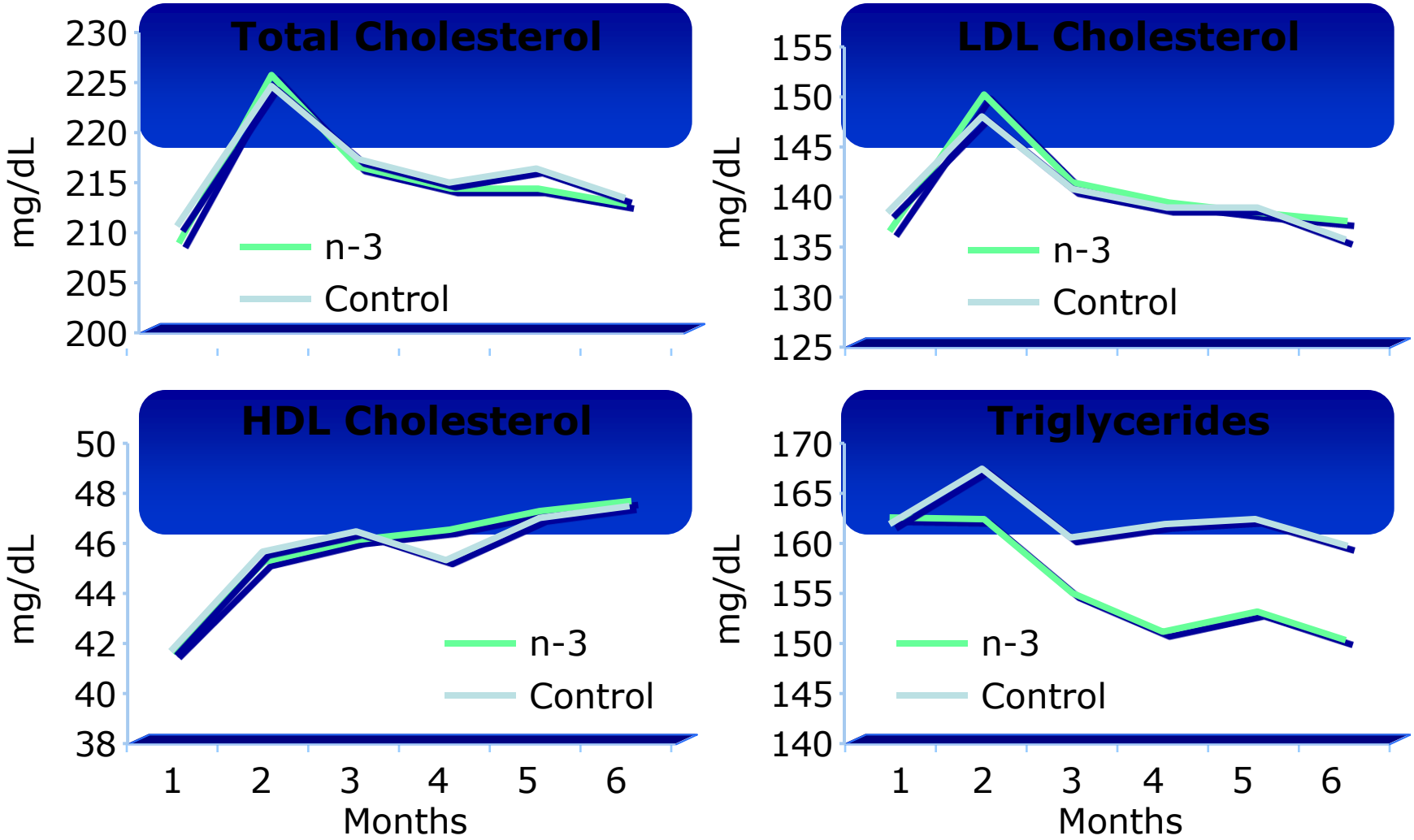
Sudden death reduced by 47% (p=0.0136)



Marchioli R et al. *Circulation* 2002;105:1897-1903.

GISSI-Prevenzione:

Effects of 850 mg/d of EPA+DHA on Serum Lipids



Marchioli R et al. *Circulation* 2002;105:1897-1903.

Omega-3 FA for Prevention of Atrial Fibrillation post CABG

- 160 patients awaiting CABG
- Supplementation began at least 5 days prior to surgery and continued through hospitalization
- Randomized to usual care or 2 capsules, each containing 866 mg EPA+DHA ethyl esters (1:2)
- Endpoint was atrial fibrillation detected by ECG during hospitalization: AF > 5 min or requiring intervention for angina or hemodynamic compromise
- Secondary endpoint was length of stay post CABG

Calo L et al. *J Am Coll Cardiol* 2005;45:1723-1728.

Omega-3 FA and Atrial Fibrillation post CABG

	Control (n = 81)	Omega-3 FA (n = 79)	P
Post-CABG AF	33%	15%	0.013
Hours of AF	24 hrs	16 hrs	0.12
Length of stay, days	8.2 days	7.3 days	0.017

Calo L et al. *J Am Coll Cardiol* 2005;45:1723-1728.

Heart Rate and sudden cardiac death (SCD)

- In men, an elevated heart rate can increase risk for SCD by nearly 6-fold,
- In women, risk is increased 9-fold.
- A reduction in heart rate with omega-3 FA supplementation may be part of the mechanism for reduced risk for SCD.

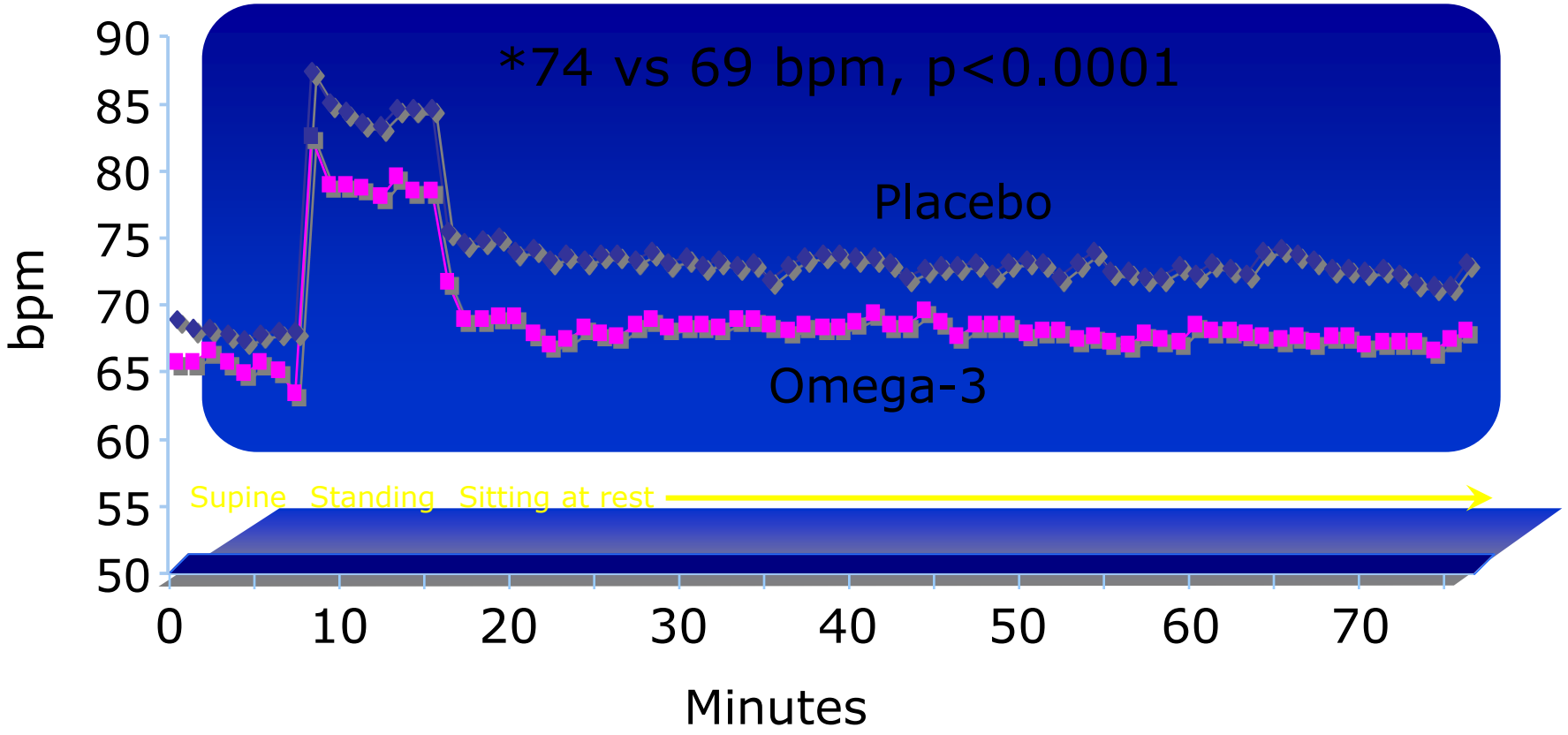
The Mechanism of Action of Low Omega-3 FA Intake in CHD Patients

- History of CHD with EF <40% on stable meds
- Randomized, double-blind, placebo-controlled crossover
- Assigned to EPA+DHA (810 mg/d) or placebo
- 4 months on each treatment
- Assessed effects on lipids, inflammatory markers, blood pressure, cardiac function, arterial compliance, and heart rate variability

O'Keefe JH Jr et al. *Am J Cardiol* 2006;97:1127-1130.

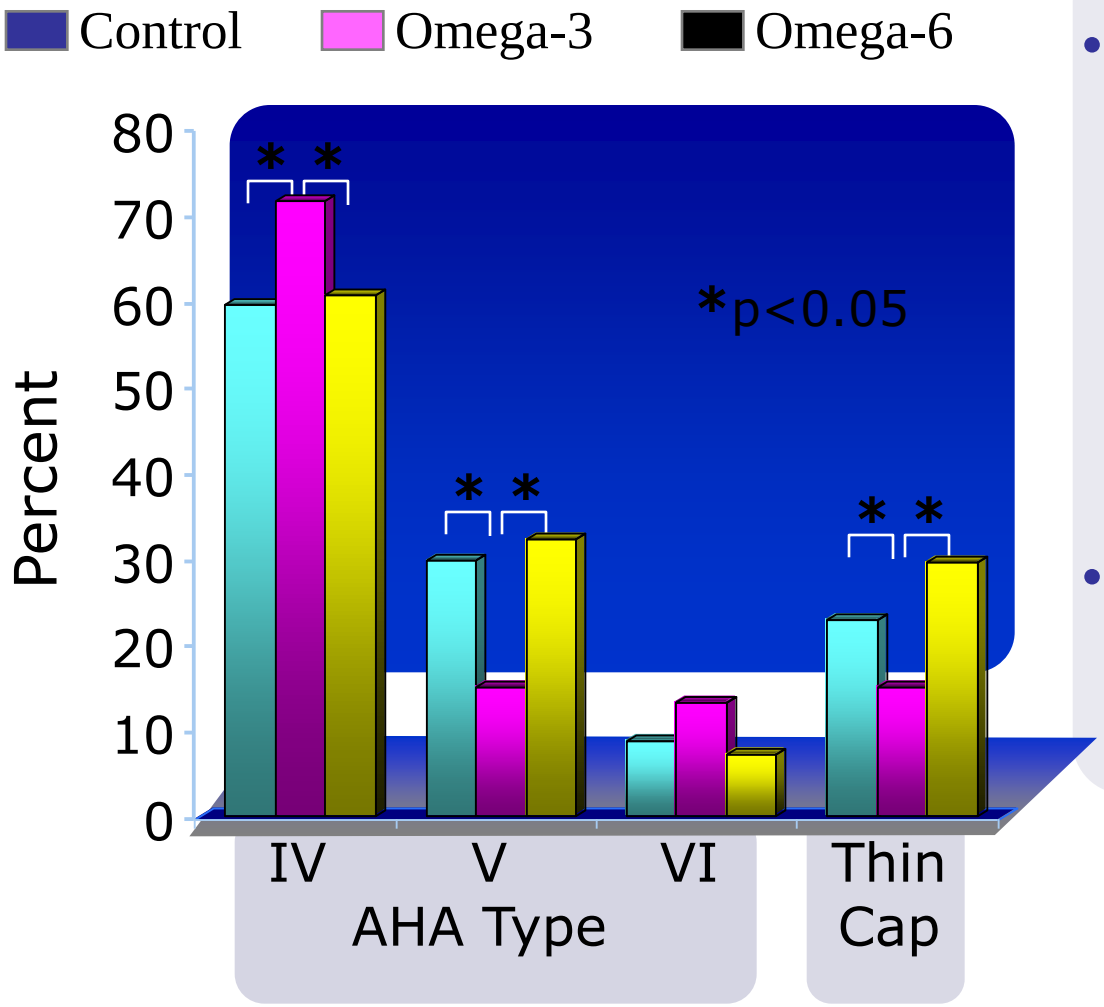
Effect of EPA+DHA (810 mg/d × 4 mo) on Heart Rate in 18 CHD Patients

O'Keefe JH Jr et al. *Am J Cardiol* 2006;97:1127-1130.



810 mg EPA/DHA reduced heart rate of patients with stable CHD with 5 beats per minute

Omega-3 FA and Plaque Stability:
Plaque Characteristics



- Patients awaiting carotid endarterectomy (n=188) were randomized to control, fish oil (omega-3), or sunflower oil (omega-6) supplementation for median 34, 46, and 43 days preprocedure
- Plaques in omega-3 patients appeared to be more stable and less vulnerable to rupture

Theis F et al. *Lancet* 2003;361:477-485.

AHA Recommendations for Omega-3 FA Intake

Population	Recommendation
Patients without documented CHD	Eat a variety of (preferably oily) fish at least twice a week. Include oils and foods rich in α-linolenic acid (flaxseed, canola, and soybean oils; flaxseeds; and walnuts)
Patients with documented CHD	Consume ~1 g of EPA+DHA per day, preferably from oily fish. EPA+DHA supplements could be considered in consultation with the physician
Patients needing triglyceride lowering	2–4 grams of EPA+DHA per day provided as capsules under a physician's care

Kris-Etherton PM et al. *Circulation* 2002;106:2747-2757.

Omega 3 Fatty Acids

Omega-3 fatty acids exist in two forms:

- ‘long-chain’ forms such as EPA& DHA –
  - oily fish such as pilchards, sardines, mackerel, kippers and salmon
- ‘short-chain’ forms, such as ALA
  - found in rapeseed oil, hemp oil, flaxseed oil and walnuts

Omega-3 supplementation

How much?

- For omega 3 to be effective, it needs to be taken in the right **form** and **dosage** on a daily basis.
- Recommends: 1 -4 **g EPA/DHA** per day

To achieve this

- Canola eggs
- Oily fish: > 3 x weekly
  - mackerel
  - salmon
  - Sardines
  - Herring
  - Pilchards
  - Trout
- Ultimate seed mix: 1TBS/day (1500 mg)
- Omega-3 supplements
  - (EPA + DHA = >1000mg)
- Nutritional drinks containing Omega3
  - Supportan, Prosure

Other consideration: Vitamin E

- Anti-oxidant: 10mg

Fearon, 2003; Fratt et al, 2003; Berber et al, 1999

Oily fish

Fish (150g)	Omega 3
Sardines in oil	4.95
Salmon	2.79
Mackerel	2.5
Pilchards in brine	2.42
Herring	2.4
Anchovy	2.1
Smoorsnoek	1.04
Tuna in brine	0.75
Trout	0.6
Haddock	0.3
Lobster	0.3
Shrimp	0.45

Omega 3 supplements

PRODUCT	DOSE	EPA	DHA
Solal Omega 3 & 6	Per capsule	220mg	73mg
Revite omega 3 salmon oil concentrate	Per capsule	180mg	120mg
Solgar Omega 3 ‘700’	Per capsule	380mg	260mg
Vital omega 3 concentrate	Per capsule	73.3mg	48.9mg
Bioharmony essential omegas	Per capsule	150mg	100mg
Omegatone	Per capsule		
Natrodale omega 3 complex	Per capsule	180mg	120mg
GNLD omega 3 salmon oil plus	Per capsule	153mg	160mg
The Real thing mega omega supreme capsule	Per capsule	400mg	300mg
Metagenics EPA DHA 720	Per capsule	430mg	290mg

THANK YOU

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