

Cardiovascular risk factor you have never heard of

What you don't know might kill you



Roman Pawlak, Ph.D., RD

Causes

States

*Lifestyle related
health conditions
are among the
main causes of
mortality*

Alzh

11,105

1



600,000

Fact sheet

50% of men and 64% of women who died suddenly of CHD had no previous symptoms of this disease.



Joannie Rochette

“According to a case-control study of 52 countries (INTERHEART), nine easily measured and potentially modifiable risk factors account for over 90 percent of the risk of an initial acute MI. ...”

American Heart Association

Cardiovascular Risk Factors

Lifestyle related health conditions account for the bulk of one's risk of a heart attack

K

ef

Other

Diabetes

Overw

Poor d

Physic

Exces

Psychosoc

Americans
(90%) have
at least one
of these
three risk
factors."

CDC

**There once was a woman who woke
up one morning, looked in a
mirror, and noticed she had only
two hairs on her head.**

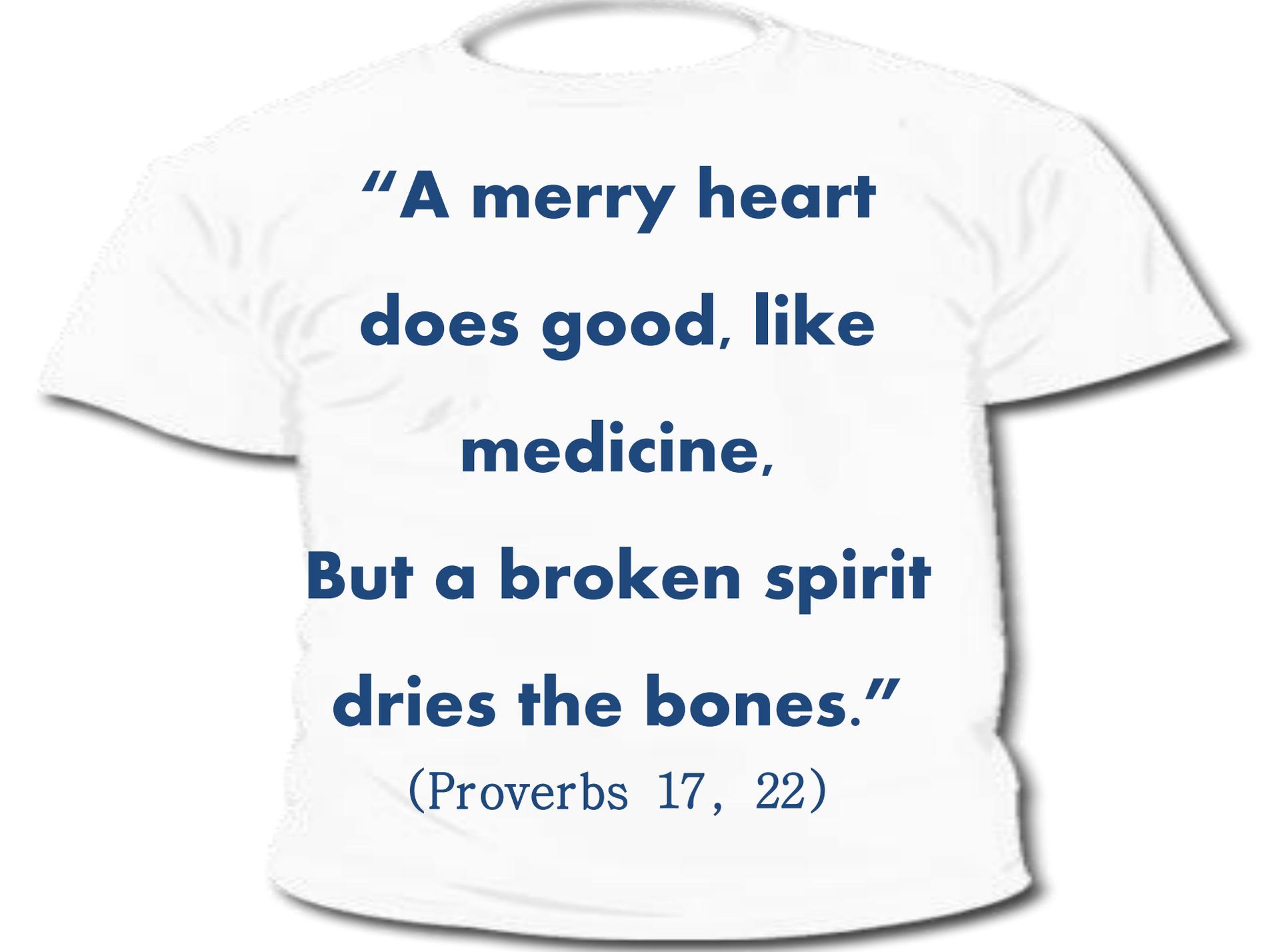
**"Hmmm," she said, "I think I'll part
my hair down the middle today."**

The next day she woke up, looked in the mirror and noticed that she had only one hair on her head.

"Well," she said, "Today I'm going to wear my hair in a pony tail."

**The next day she woke up, looked
in the mirror and noticed that
there wasn't a single hair on her
head.**

**“GREAT!” she exclaimed, “I don't
have to fix my hair today!”**



**“A merry heart
does good, like
medicine,**

**But a broken spirit
dries the bones.”**

(Proverbs 17, 22)

LIFESTYLE
AND CVD
PREVENTION

Healthy Living Is the Best Revenge

Findings From the European Prospective Investigation Into Cancer and Nutrition–Potsdam Study Arch Intern Med. 2009;169(15):1355-1362

Earl S. Ford, MD, MPH; Manuela M. Bergmann, PhD; Janine Kröger; Anja Schienkiewitz, PhD, MPH; Cornelia Weikert, MD, MPH; Heiner Boeing, PhD, MSPH

**The study participants were
23,153 Germans age 35 - 65**

Healthy living is the best revenge



Non-smoking



BMI < 30



Physical activity \geq 3.5 hrs/week



Diet composed of



High intake of fruits and vegetables

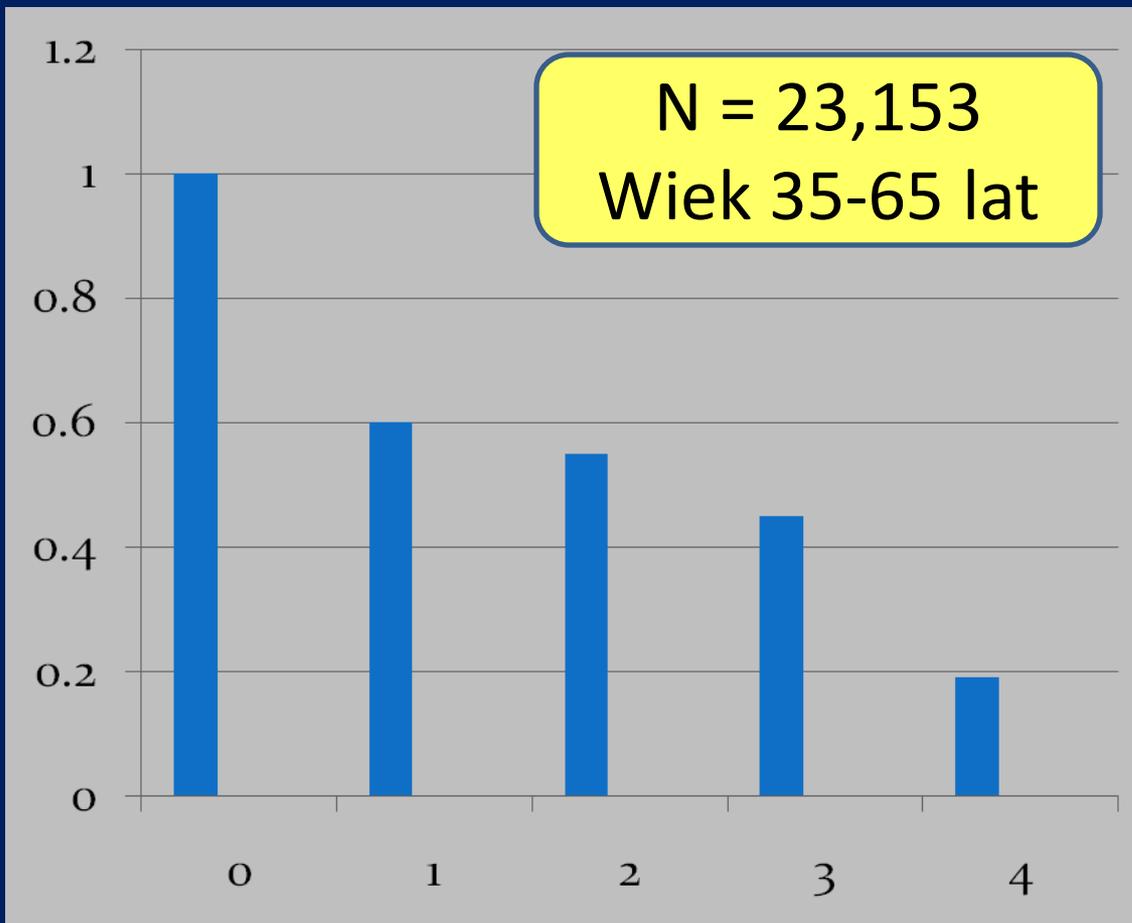


Whole grains



Small amounts of meat

Healthy living is the best revenge

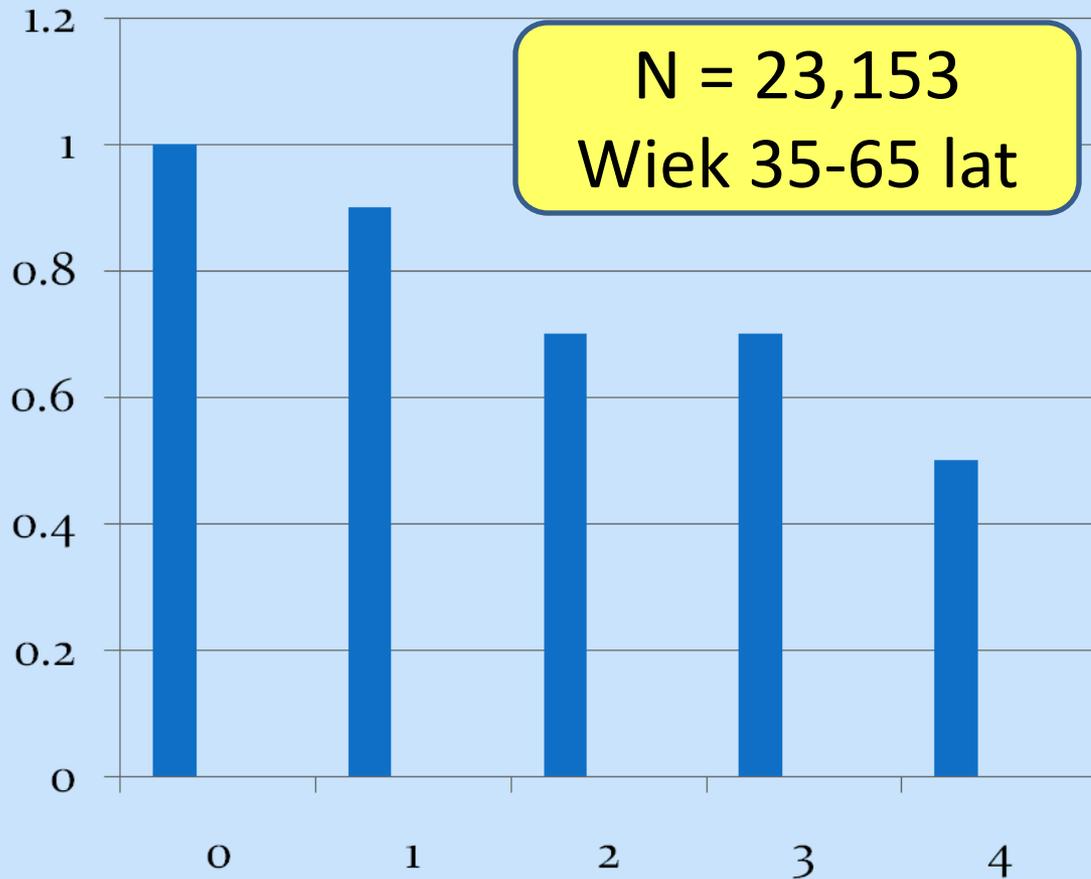


Number of lifestyle factors

Ford et al., Arch Intern Med. 2009;169(15):1355-1362

“Compared with participants with no healthy factors, those with all 4 healthy factors had reduction of 81% for myocardial infarction.”

Healthy living is the best revenge



Number of lifestyle factors

“Compared with participants with no healthy factors, those with all 4 healthy factors had reduction of 50% for stroke.”

**“The message from our analysis
of the data from the
EPIC-Potsdam study is clear:
adopting a few healthy behaviors
can have a major impact on the
risk of morbidity.”**

(p. 1357)

**HOW DOES
DIET IMPACT
CVD RISK
FACTORS?**

- **cigarette smoking**

- ✓ **• abnormal blood lipid levels**

- **hypertension**

- **diabetes**

- **abdominal obesity**

- **low daily fruit and vegetable consumption**

- **a lack of physical activity**

- **alcohol overconsumption**

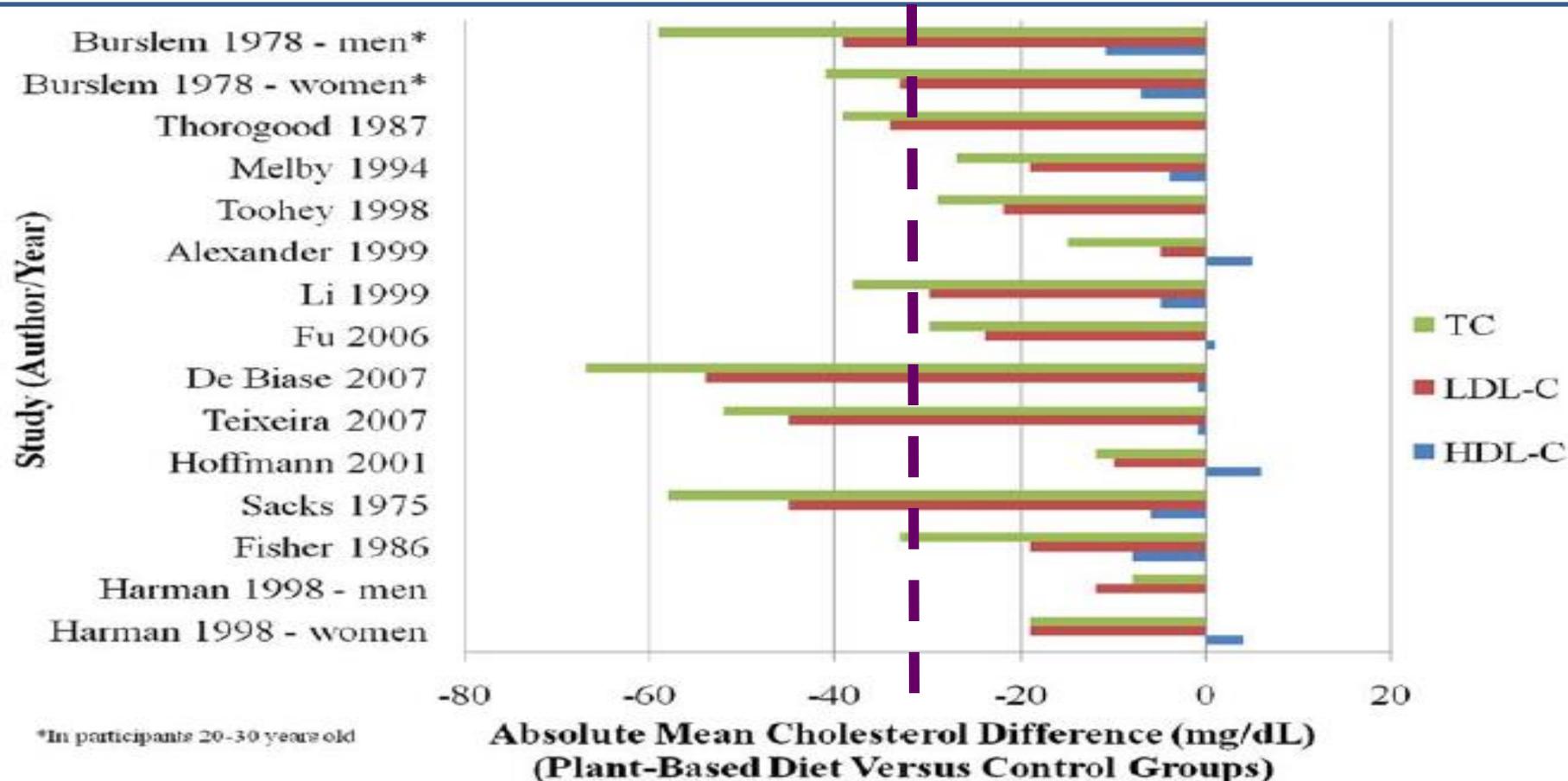
- **psychosocial index**

Effects of Plant-Based Diets on Plasma Lipids

Am J Cardiol 2009;104:947–956

Hope R. Ferdowsian, MD, MPH^{a,b,*}, and Neal D. Barnard, MD^{a,b}

Mean cholesterol change



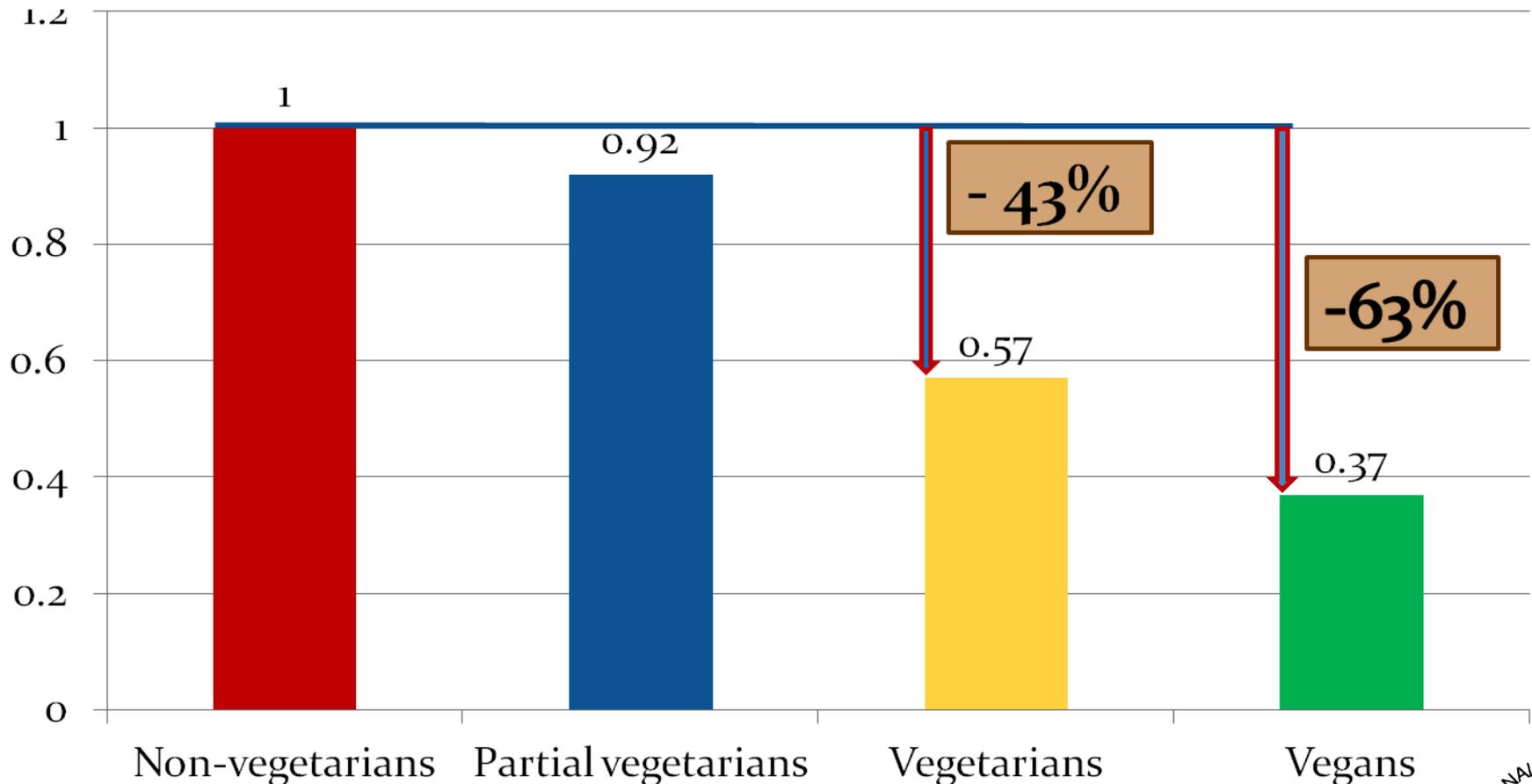
*In participants 20-30 years old

- cigarette smoking
- abnormal blood lipid levels

 • **hypertension**

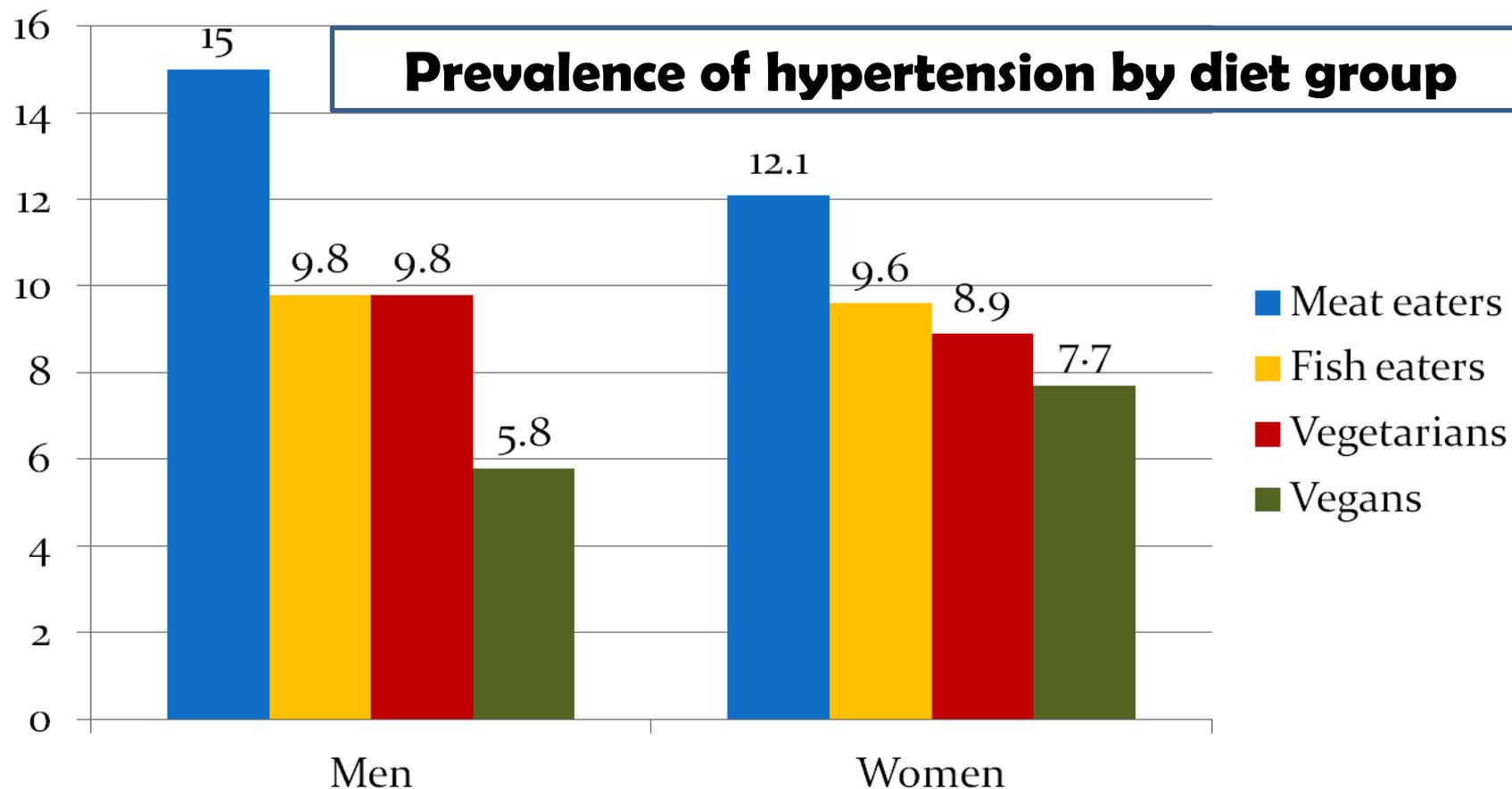
- diabetes
- abdominal obesity
- low daily fruit and vegetable consumption
- a lack of physical activity
- alcohol overconsumption
- psychosocial index

Vegetarian diets and blood pressure among white subjects: results from the Adventist Health Study-2



Hypertension and blood pressure among meat eaters, fish eaters, vegetarians and vegans in EPIC Oxdord.

Appleby PN., et al. Public Health Nutrition, 2002;5(5):645-654



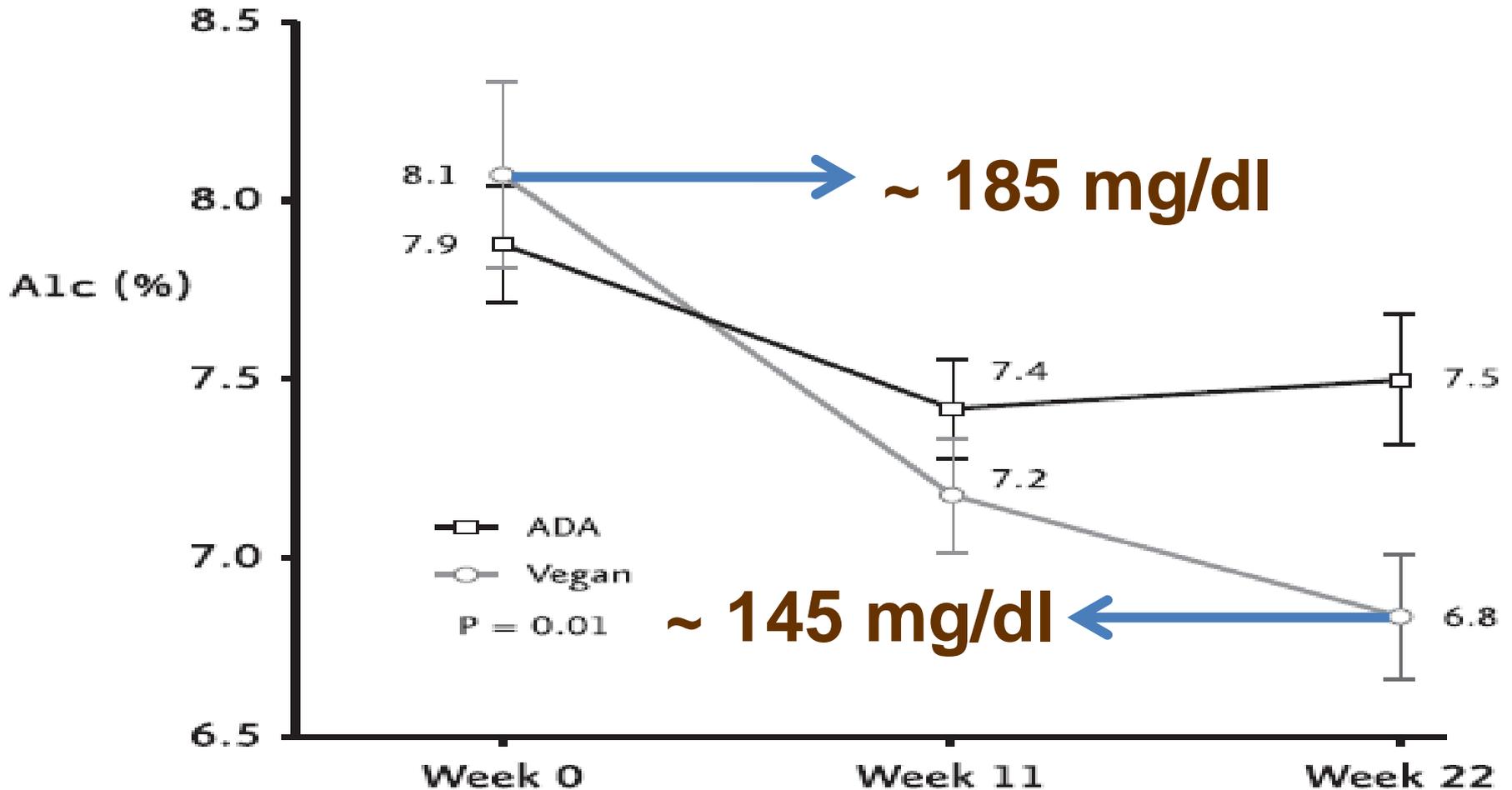
- **cigarette smoking**
- **abnormal blood lipid levels**
- **hypertension**

 • **diabetes**

- **abdominal obesity**
- **low daily fruit and vegetable consumption**
- **a lack of physical activity**
- **alcohol overconsumption**
- **psychosocial index**

Vegetarian and vegan diets in type 2 diabetes management

Barnard et al., Nutrition Reviews, 2009;67(5):255–263

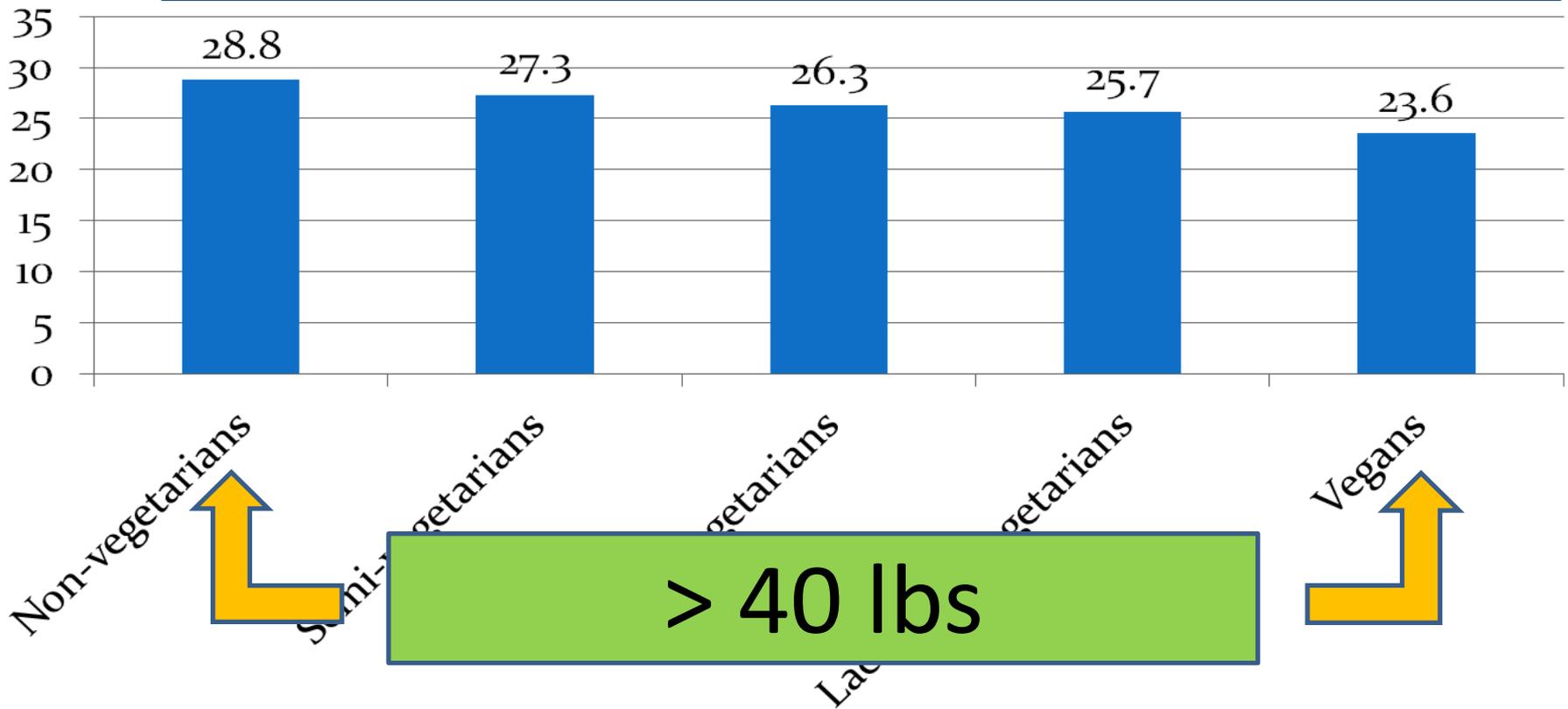


- cigarette smoking
- abnormal blood lipid levels
- hypertension
- diabetes
- ✓ • **abdominal obesity**
 - low daily fruit and vegetable consumption
 - a lack of physical activity
 - alcohol overconsumption
 - psychosocial index

Type of Vegetarian Diet, Body Weight, and Prevalence of Type 2 Diabetes

Tonstad S., et al Diabetes Care 2009;32:791–796

Average BMI by diet group



**Is there anything
else that you can
do?**

Vitamin B-12 and homocysteine status among vegetarians: a global perspective

Elmadfa I. and Singer I. Am J Clin Nutr 2009;89(suppl):1693S–8S

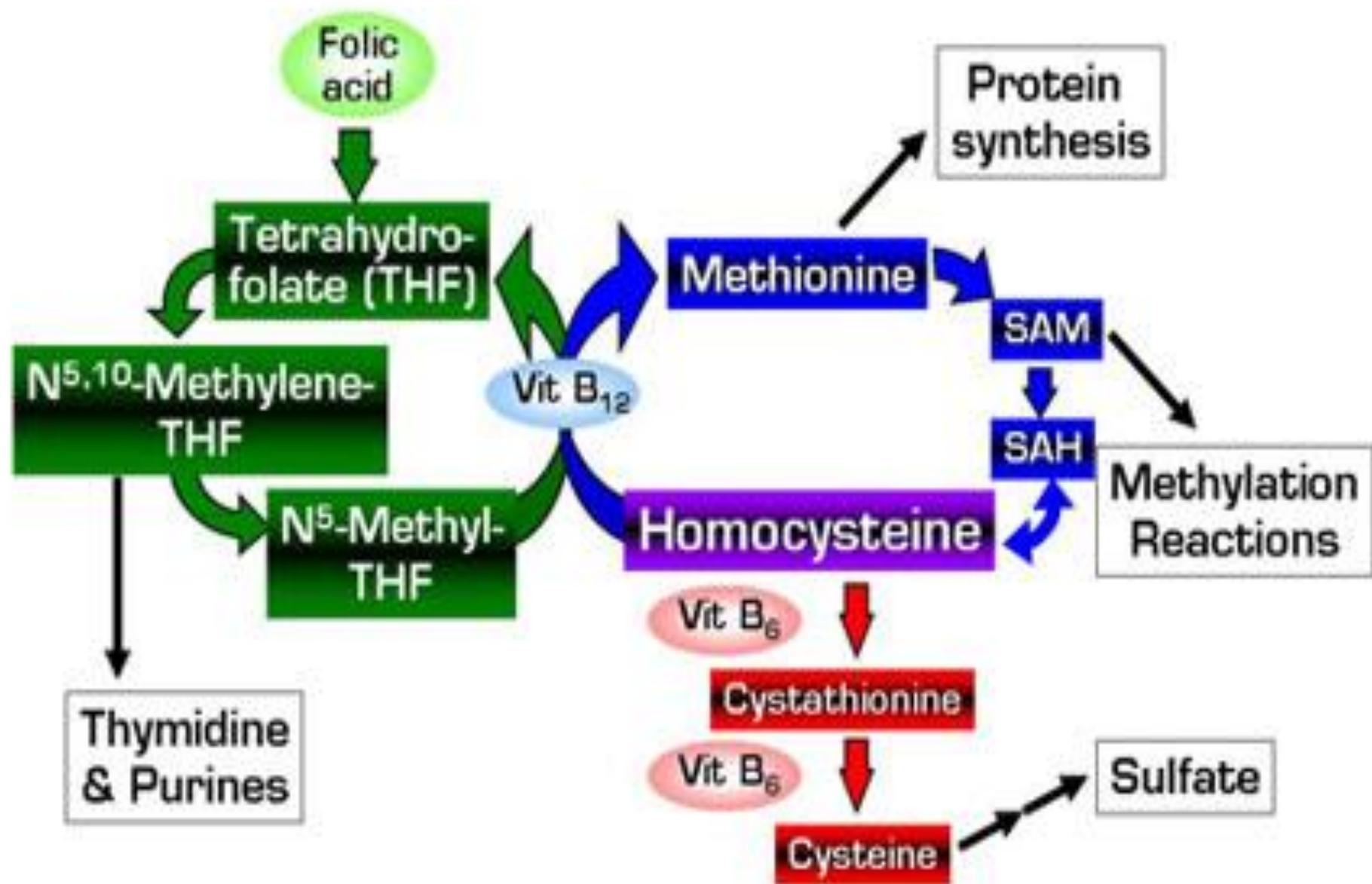
“Strong evidence gathered over the past decade indicates that even mild hyperhomocysteinemia represents an independent risk factor for atherosclerosis and thromboembolic diseases.”

Homocysteine Level and Coronary Heart Disease Incidence: A Systematic Review and Meta-analysis

Humphrey et al, Mayo Clin Proc. 2008;83(11):1203-1212

“Each increase of 5 $\mu\text{mol/L}$ in homocysteine level increases the risk of CHD events by approximately 20%, independently of traditional CHD risk factors.”

What is homocysteine and what factors play a role in serum homocysteine concentration?



SAM, S-adenosylmethionine; SAH, S-adenosylhomocysteine

German Vegan Study: Diet, Life-Style Factors, and Cardiovascular Risk Profile

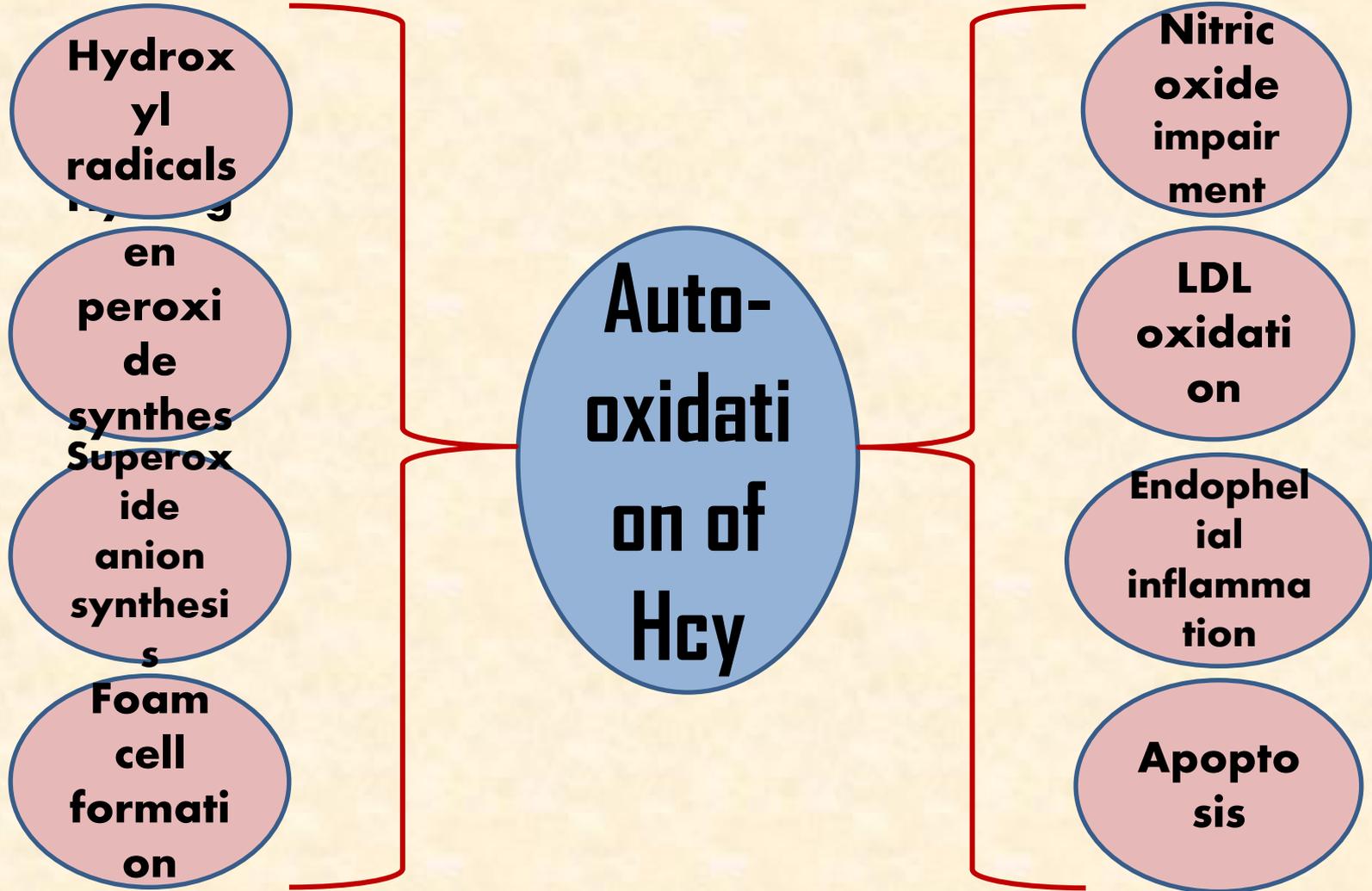
Waldmann et al, Ann Nutr Metab 2005;49:366-372

“In persons with high folic acid intakes as well as in vegetarians and especially in vegans hyperhomocysteinemia is rather the consequence of cobalamin deficiency.”

**How does elevated
homocysteine increase
risk of heart disease?**

Is Vitamin B12 Deficiency a Risk Factor for Cardiovascular Disease in Vegetarians?

Pawlak R. Am J Prev Med 2015;48(6):e11–e26



Role of homocysteine in aortic calcification and osteogenic cell differentiation

Van Campenhout A., et al. *Atherosclerosis*. 2009;202(2): 557–566

fatty substances,
cholesterol,
cellular waste products,
calcium

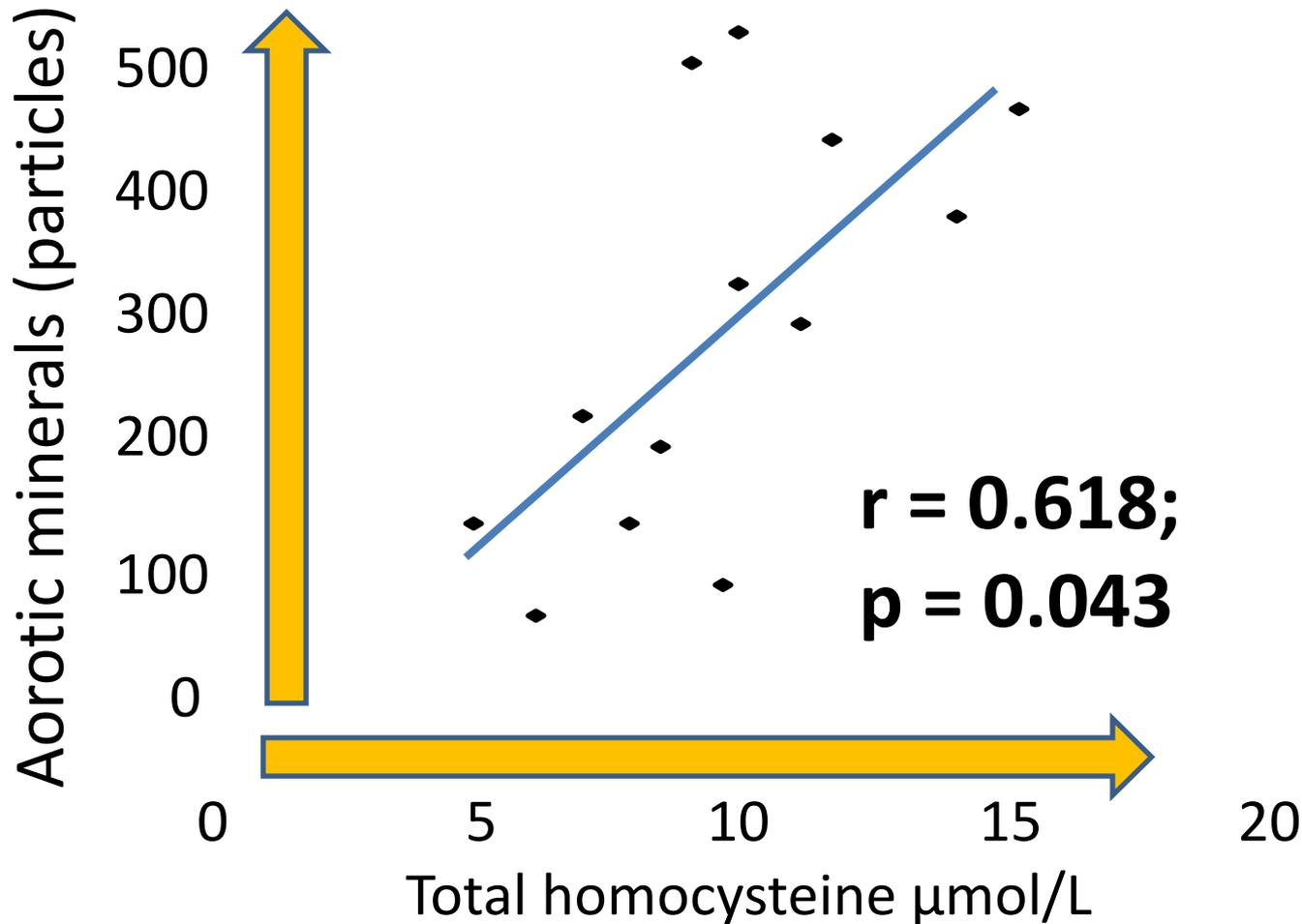
fibrin

homocysteine

Thick fibrous shell



Is a low blood level of vitamin B12 a cardiovascular and diabetes risk factor? A systematic review of cohort studies

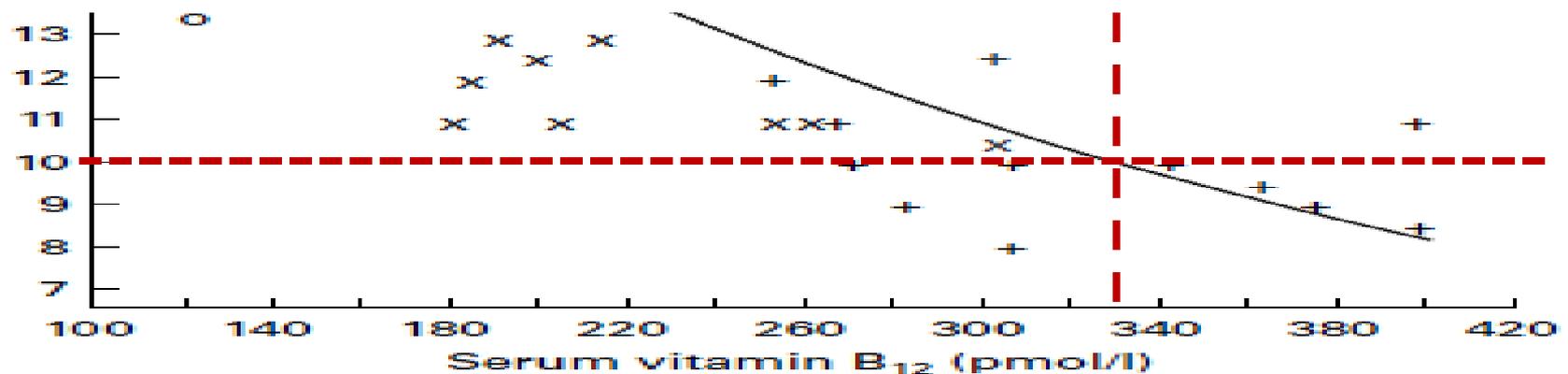


**What is the ideal
vitamin B12 and
homocysteine
status?**

Plasma total homocysteine status of vegetarians compared with omnivores: a systematic review and meta-analysis

Obersby et al, Br J Nutr, 2013;109:785-794

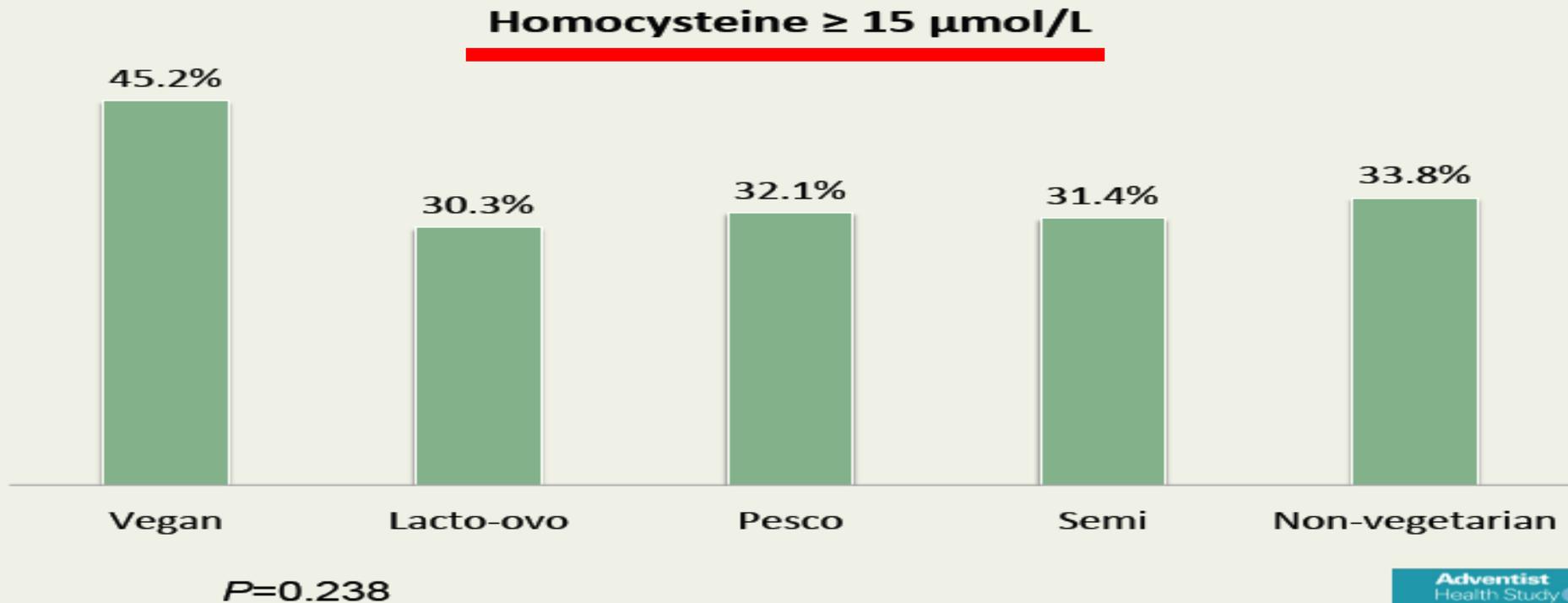
Diet	Plasma tHcy ($\mu\text{mol/l}$)				Serum vitamin B ₁₂ (pmol/l)			
	Mean	SD	n	P	Mean	SD	n	P
Omnivores	11.03	2.89	14		303	72	14	
Lactovegetarians or lacto-ovovegetarians	13.91	3.15	15	<0.025	209	47	15	<0.005
Vegans	16.41	4.80	9	<0.005	172	59	9	<0.005



THE VITAMIN B12 STORY: WHY IS IT STILL A CONCERN?

Haddad E. Lecture presentation. 6th International Congress on Vegetarian Nutrition,
Loma Linda University, Feb. 26, 2013

Percentage of individuals with high plasma
homocysteine according to diet group



What impact taking
vitamin B12 supplement
may have on risk of
heart disease?

VITAMIN B-12 SUPPLEMENTATION IMPROVES ARTERIAL FUNCTION IN VEGETARIANS WITH SUBNORMAL VITAMIN B-12 STATUS

The Journal of Nutrition, Health & Aging©
Volume 16, Number 6, 2012

T. KWOK¹, P. CHOOK^{1,2}, M. QIAO¹, L. TAM¹, Y.K.P. POON¹, A.T. AHUJA³, J. WOO¹,
D.S. CELERMAJER⁴, K.S. WOO^{1,2}

- 50 healthy vegetarians (mean age 45 years; > 6 years of adherence to vegetarian diet)
- Faze 1 – placebo
- Faze 2 – 500 µg/day for 12 weeks
- Faze 3 – 500 µg/day for an additional 24 weeks

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D.S. CELERMAJER⁴, K.S. WOO^{1,2}

Carotid intima-media thickness

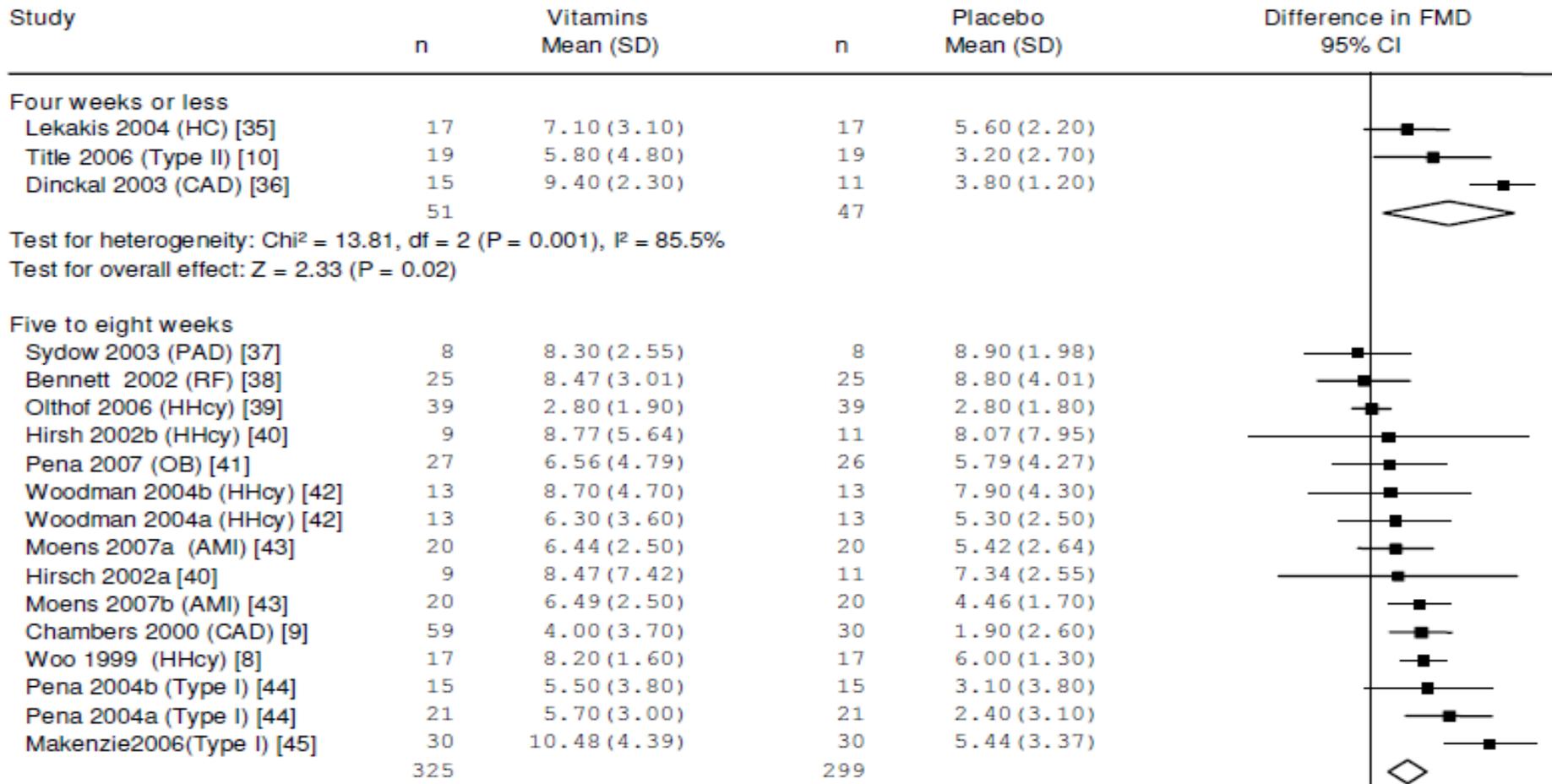
Branchial flow-mediated dialation

“(...) vitamin B-12 supplementation in asymptomatic vegetarians with compromised vitamin B-12 status may lead to a significant improvement in arterial endothelial function and carotid intima-media thickness, with potential benefit on cardiovascular health.”

The effect of long-term homocysteine-lowering on carotid intima-media thickness and flow-mediated vasodilation in stroke patients: a randomized controlled trial and meta-analysis

Potter K., et al. *BMC Cardiovascular Disorders* 2008, 8:24 doi:10.1186/1471-2261-8-24

Change in FMD associated with B-vitamin treatment



Conclusion

**Lifestyle factors account for the bulk of
the risk of CVD**

**Diet composed mainly or exclusively of
foods of plant origin improve CVD risk
factors and risk of CVD**

Conclusion

Hyperhomocysteinemia is associated with an increased risk of atherosclerosis and cardiovascular disease.

Hyperhomocysteinemia increases risk of cardiovascular disease even among people adhering to a healthy diet, such as vegetarians. Given these health concerns, it is advisable to monitor vitamin B-12 status and homocysteine concentration and to use vitamin B12 supplements.

