

# 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.**

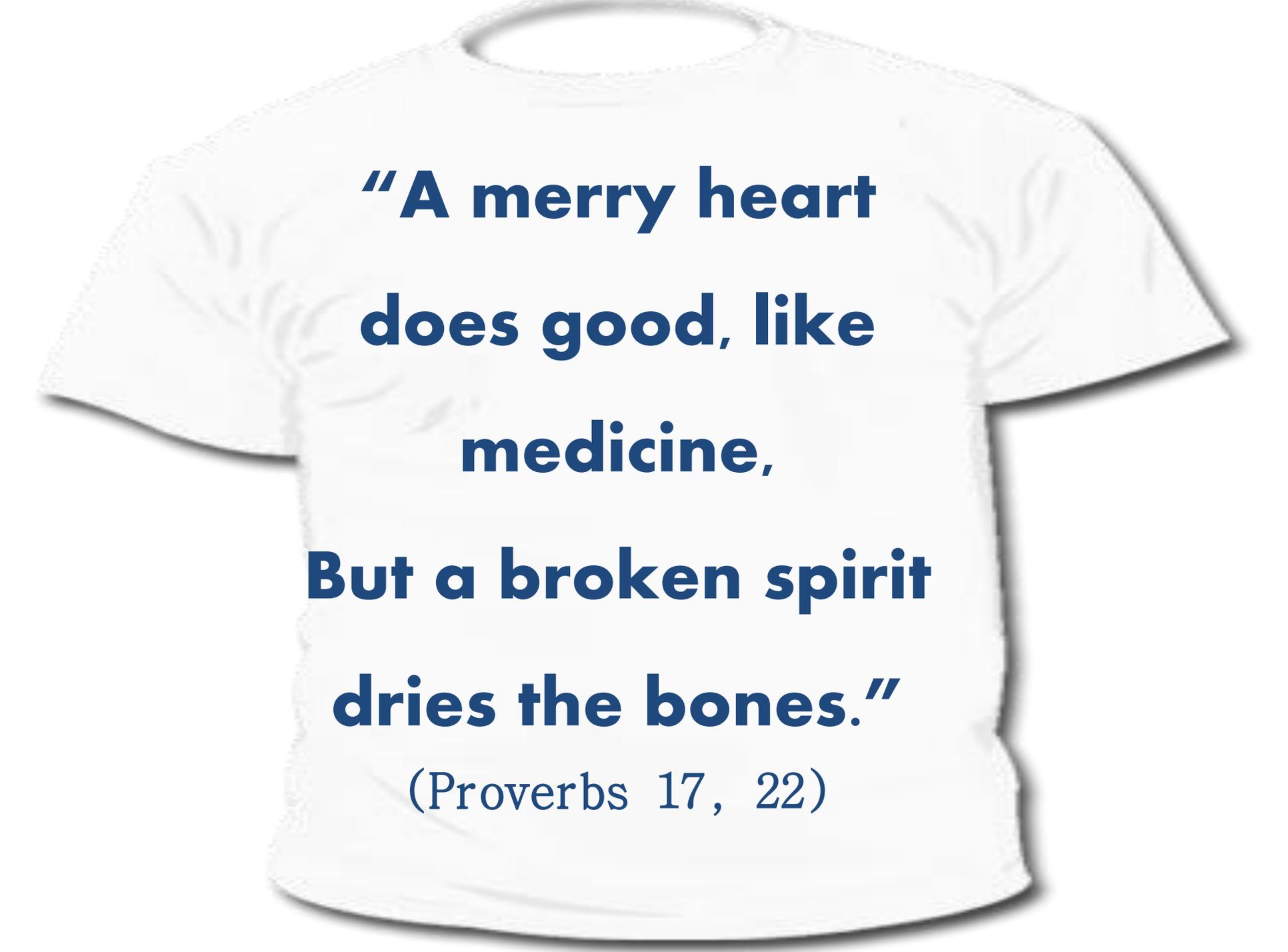
**"Hmmm," she said, "I think I'll part  
my hair down the middle today."**

**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

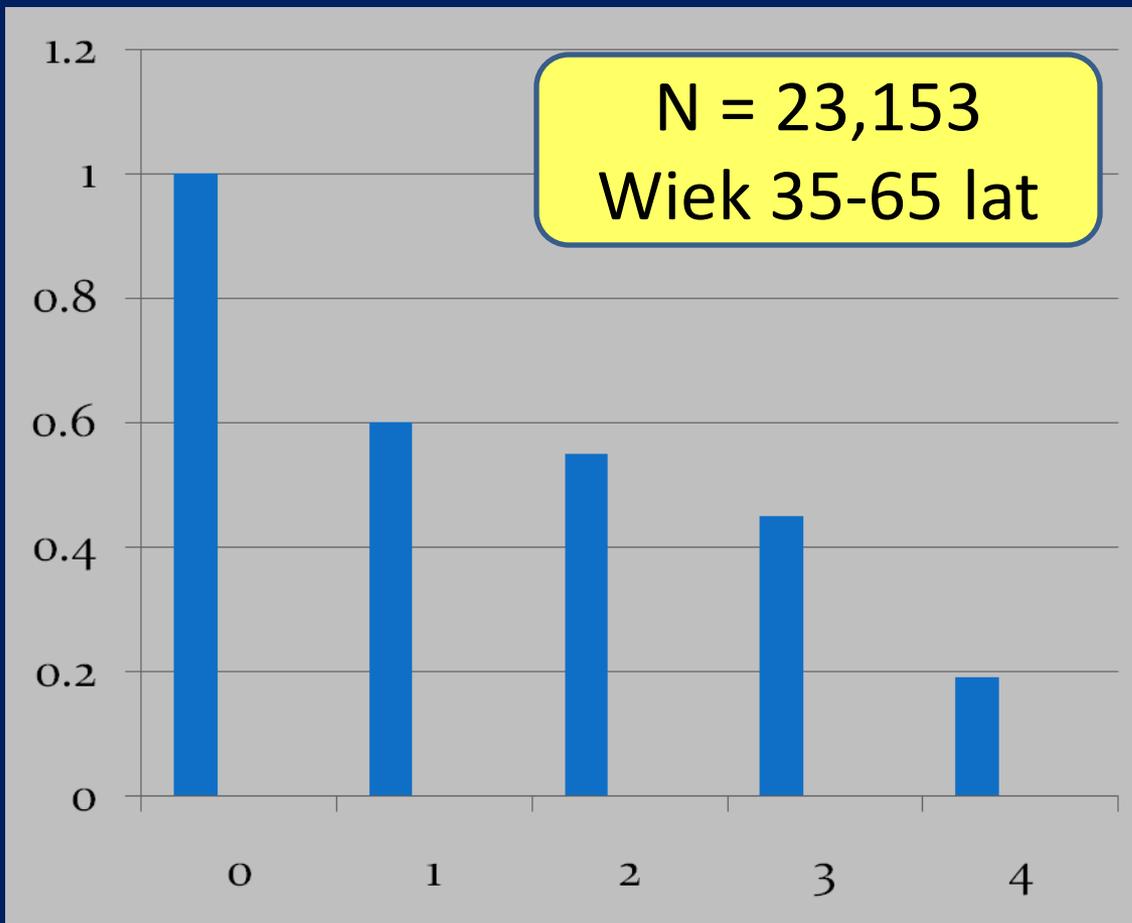


Whole grains



Small amounts of meat

# Healthy living is the best revenge

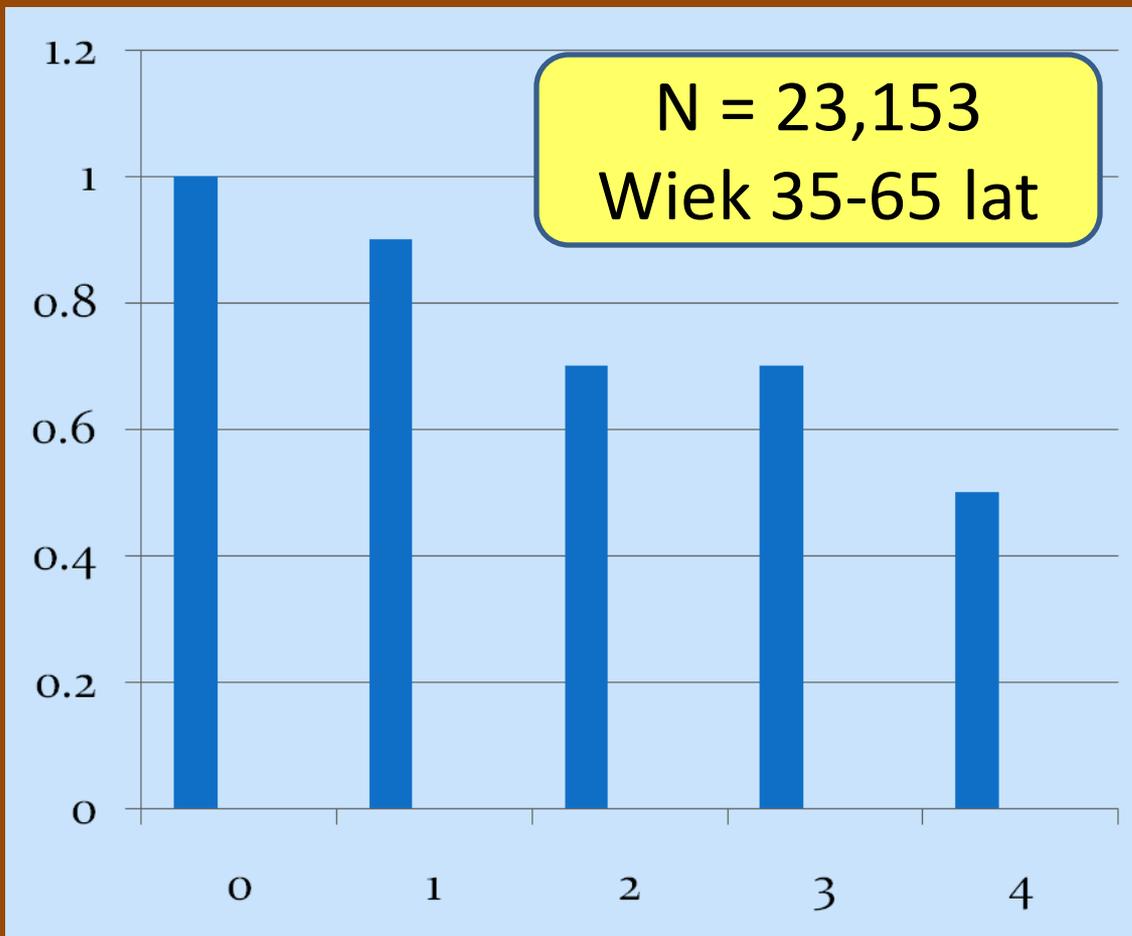


Number of lifestyle factors

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**

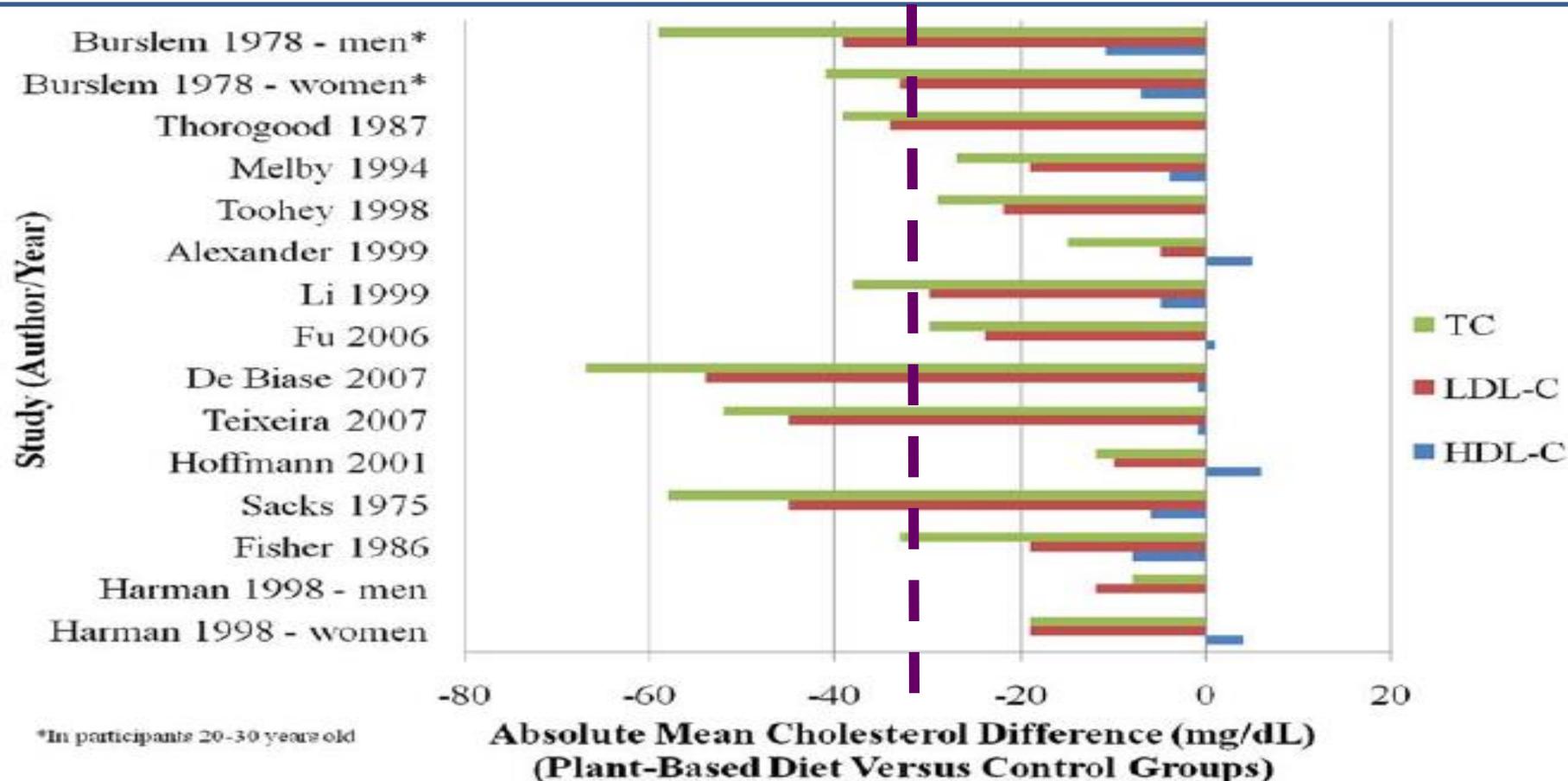
- **psychosocial index**

# Effects of Plant-Based Diets on Plasma Lipids

Am J Cardiol 2009;104:947–956

Hope R. Ferdowsian, MD, MPH<sup>a,b,\*</sup>, and Neal D. Barnard, MD<sup>a,b</sup>

## Mean cholesterol change

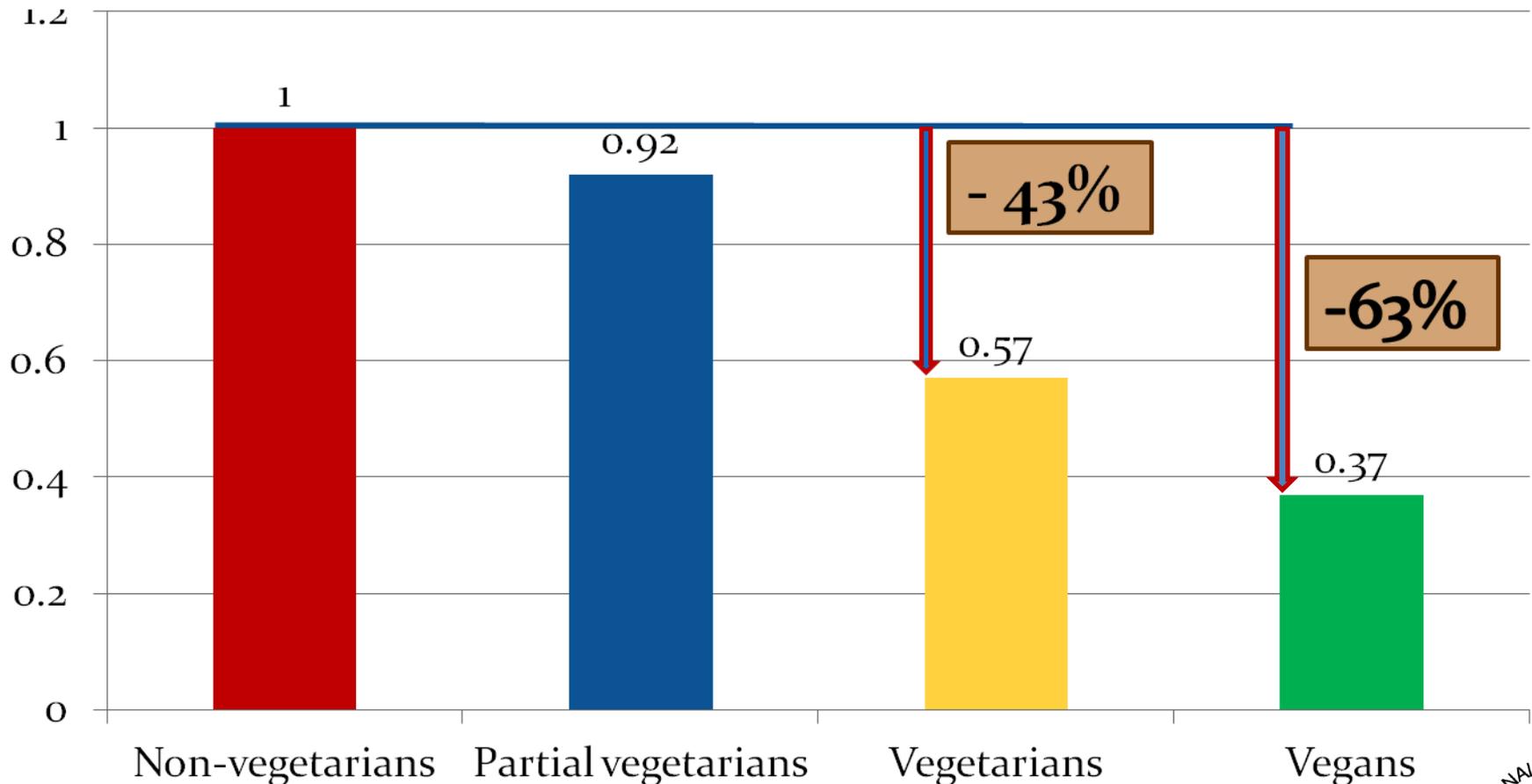


- cigarette smoking
- abnormal blood lipid levels

 • **hypertension**

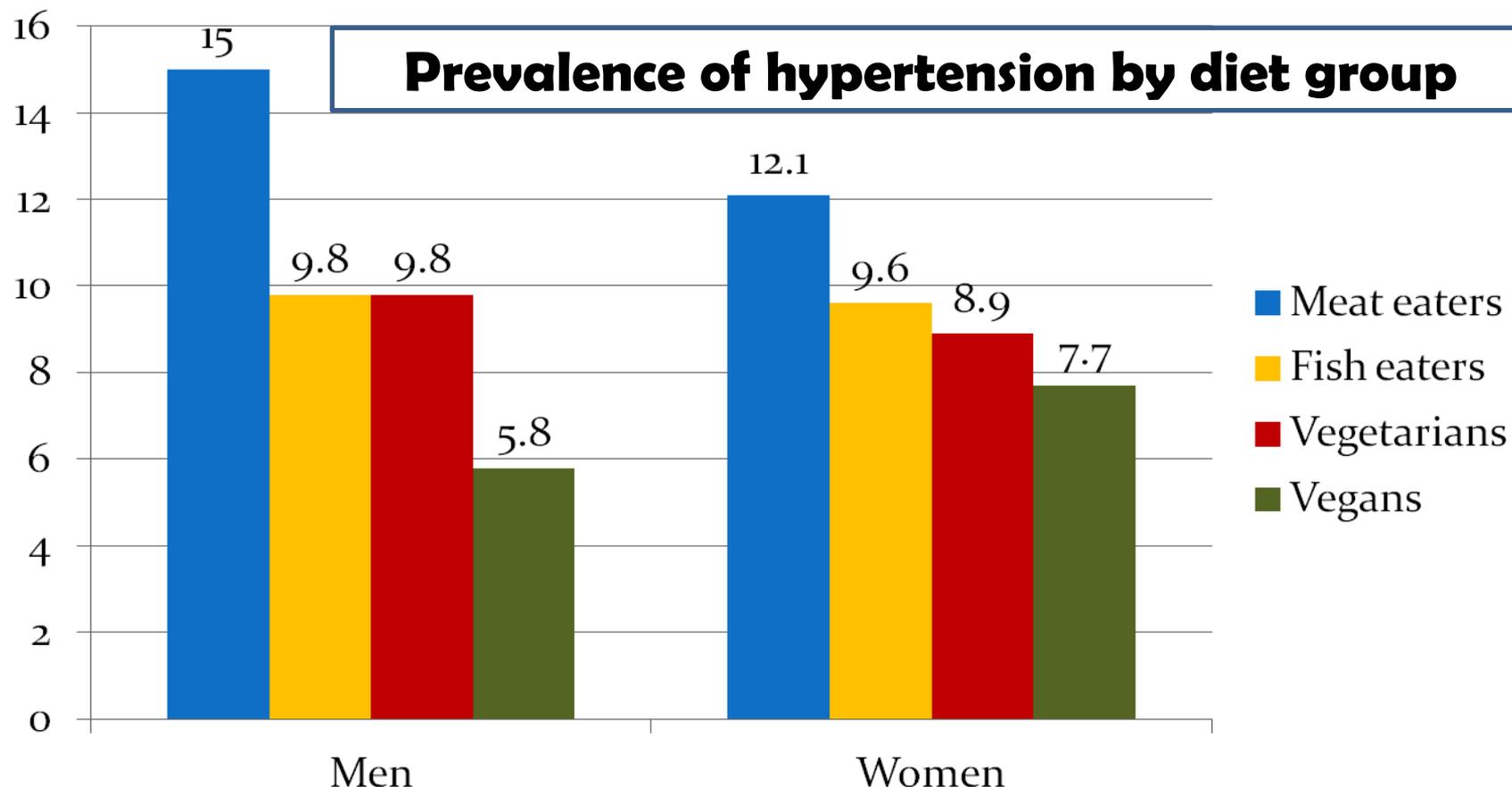
- diabetes
- abdominal obesity
- low daily fruit and vegetable consumption
- a lack of physical activity
- alcohol overconsumption
- psychosocial index

# 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



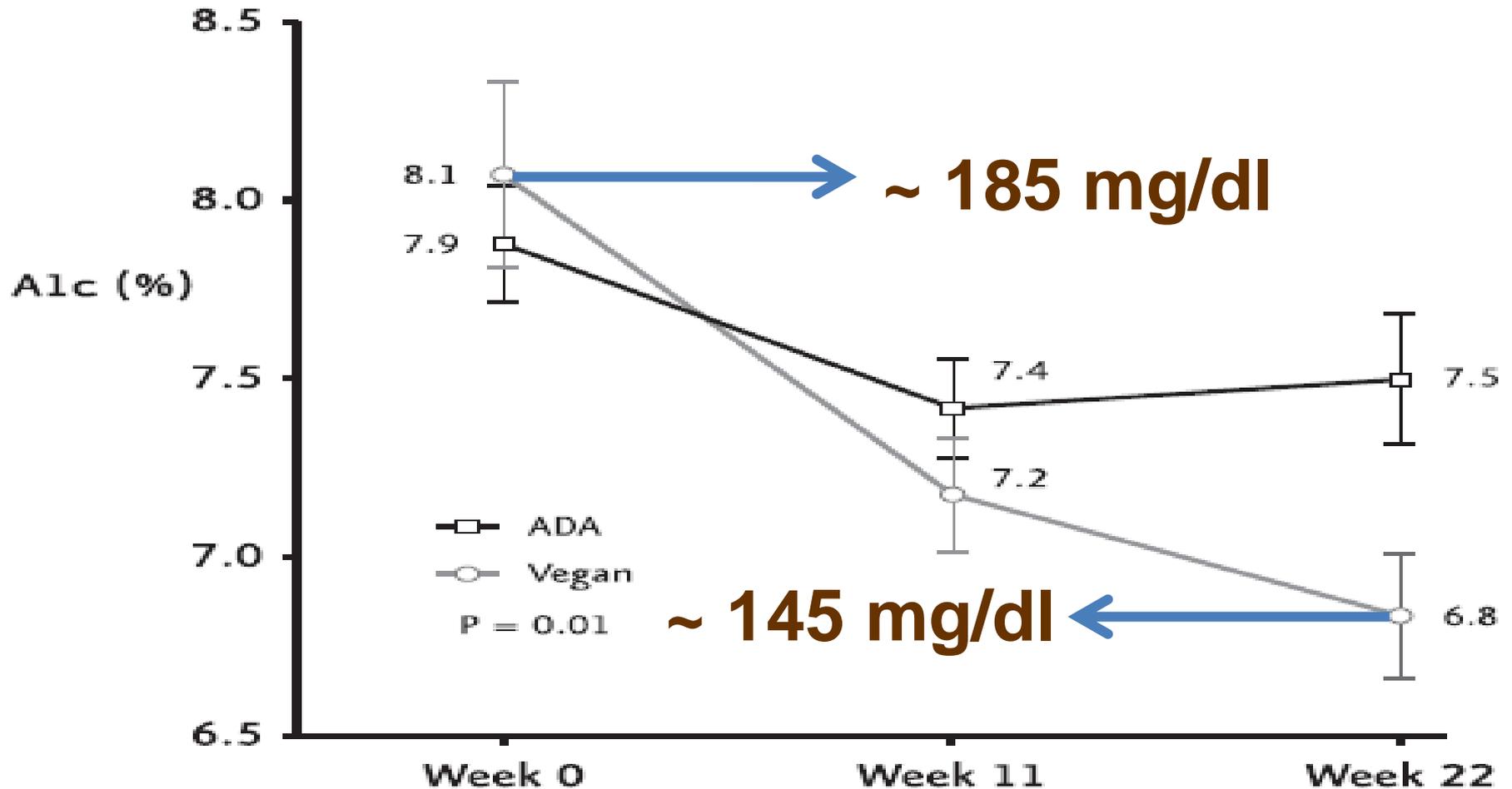
- **cigarette smoking**
- **abnormal blood lipid levels**
- **hypertension**

 • **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

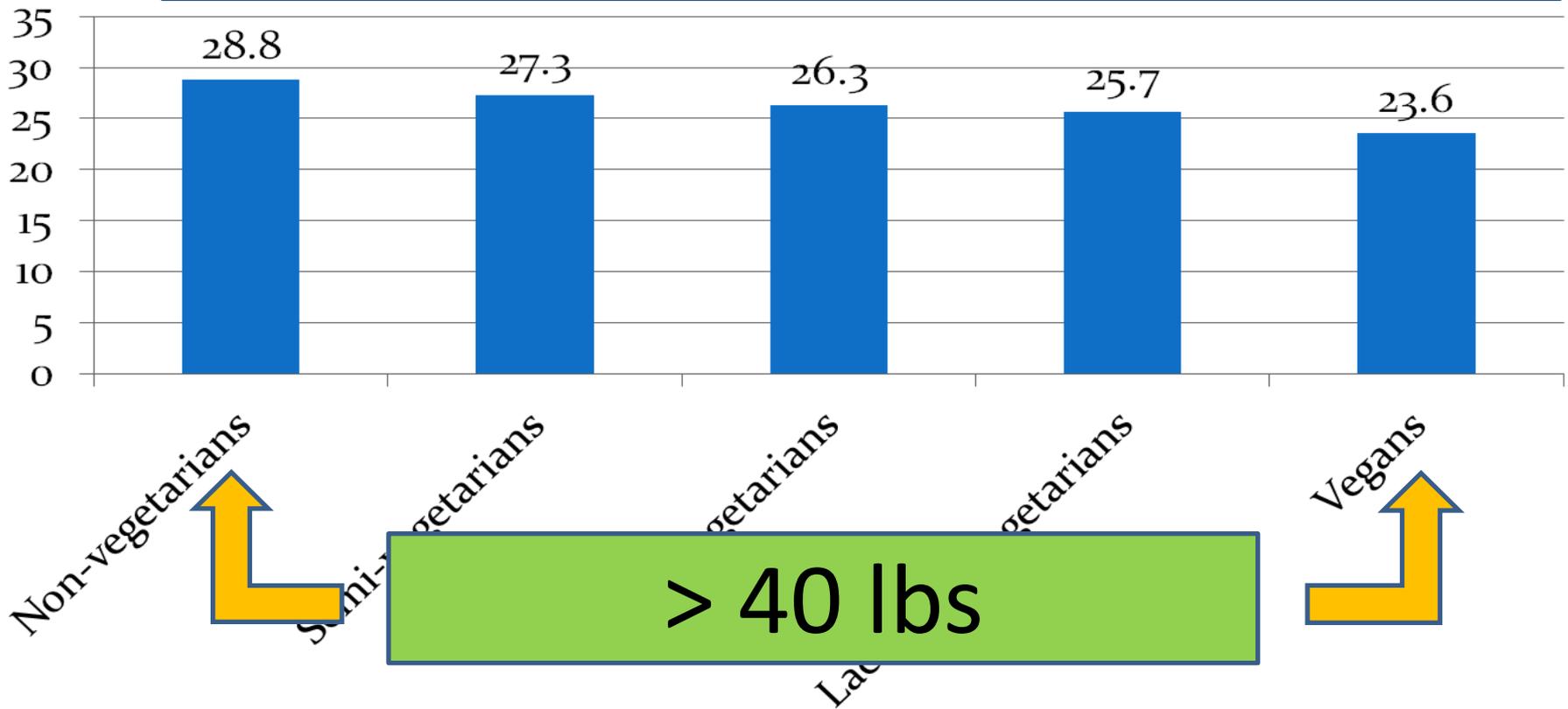


- cigarette smoking
- abnormal blood lipid levels
- hypertension
- diabetes
- ✓ • **abdominal obesity**
  - low daily fruit and vegetable consumption
  - a lack of physical activity
  - alcohol overconsumption
  - psychosocial index

# 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.”

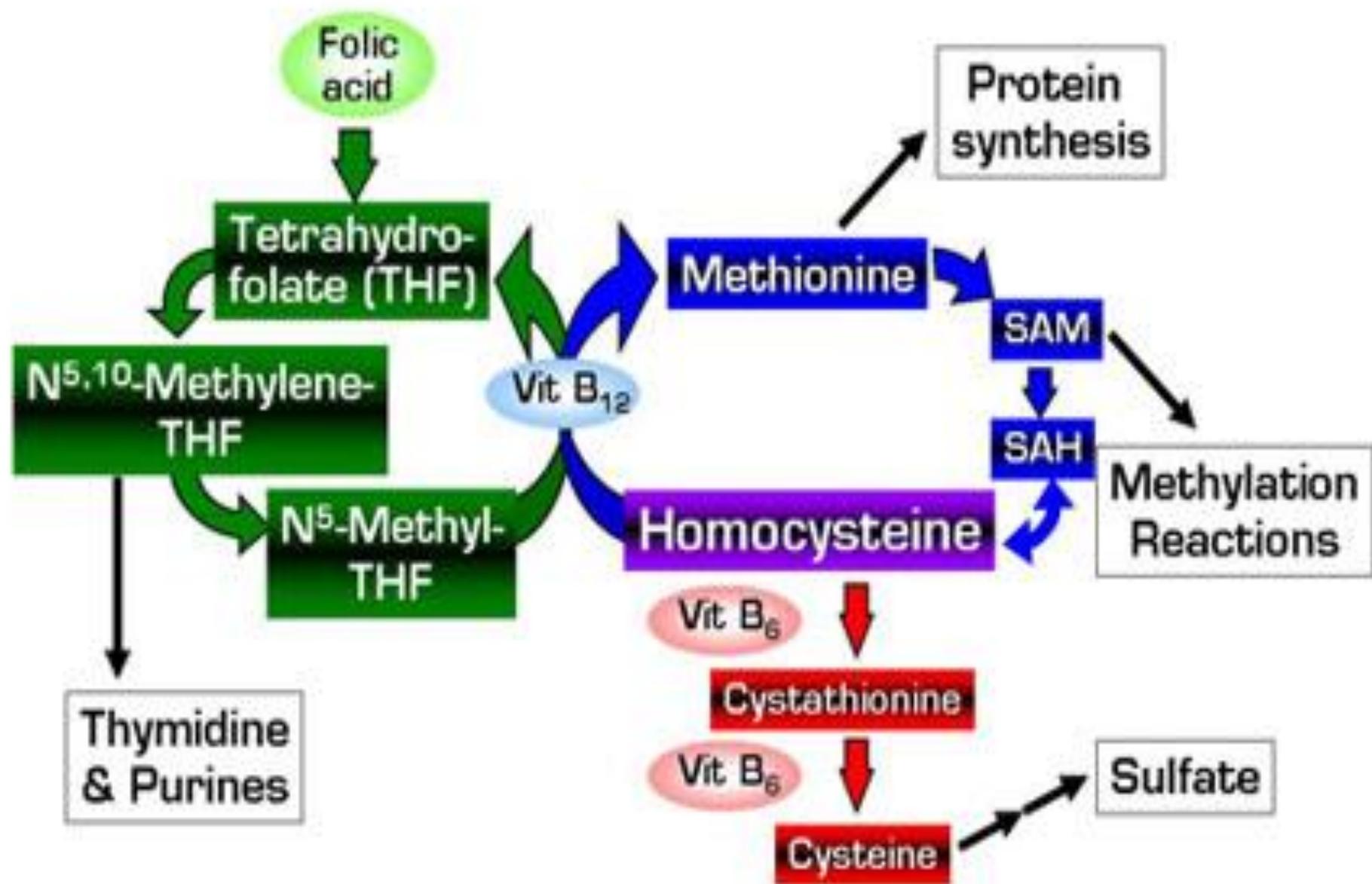
# Homocysteine Level and Coronary Heart Disease Incidence:

## 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

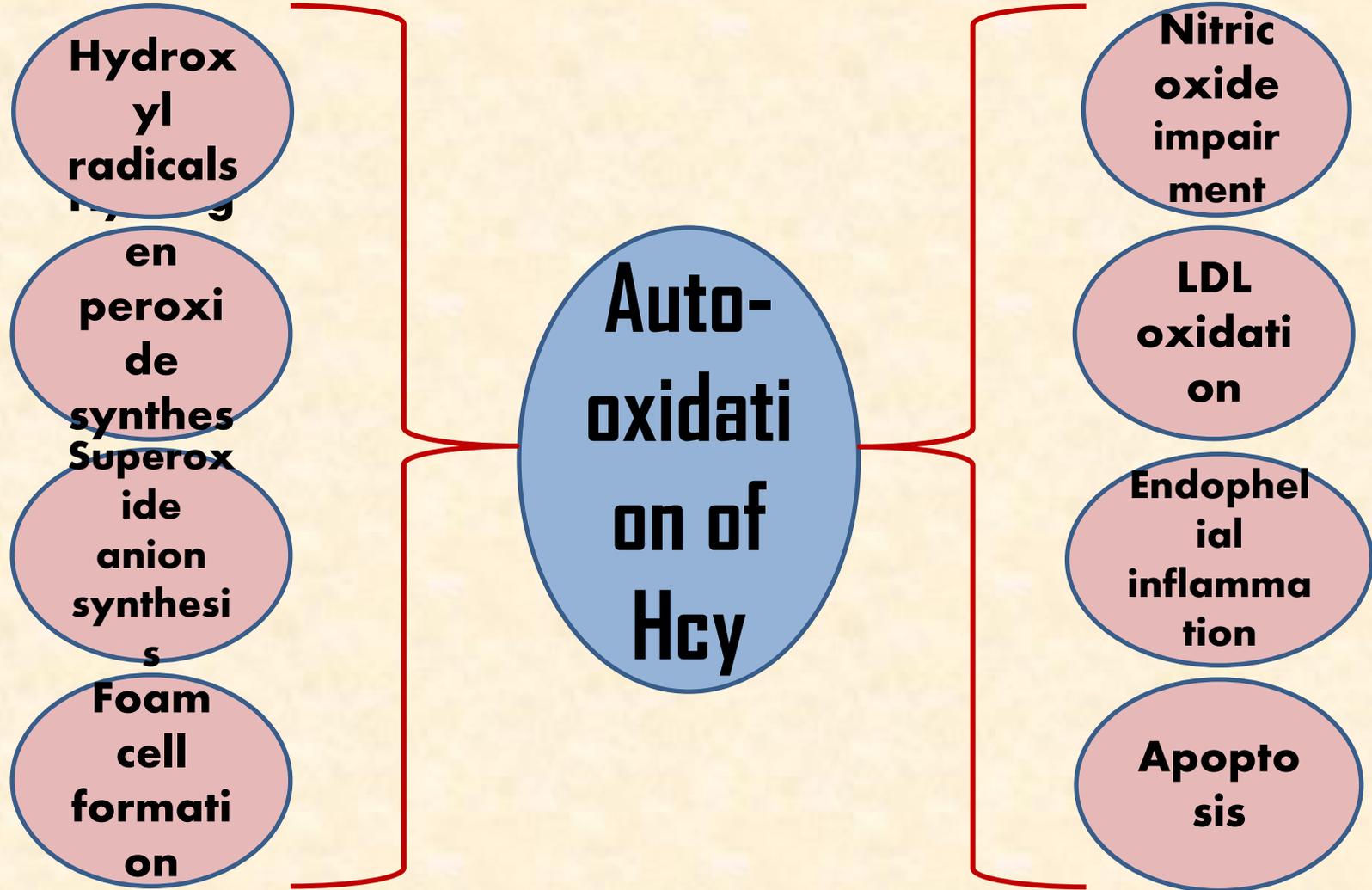
Waldmann et al, Ann Nutr Metab 2005;49:366-372

“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

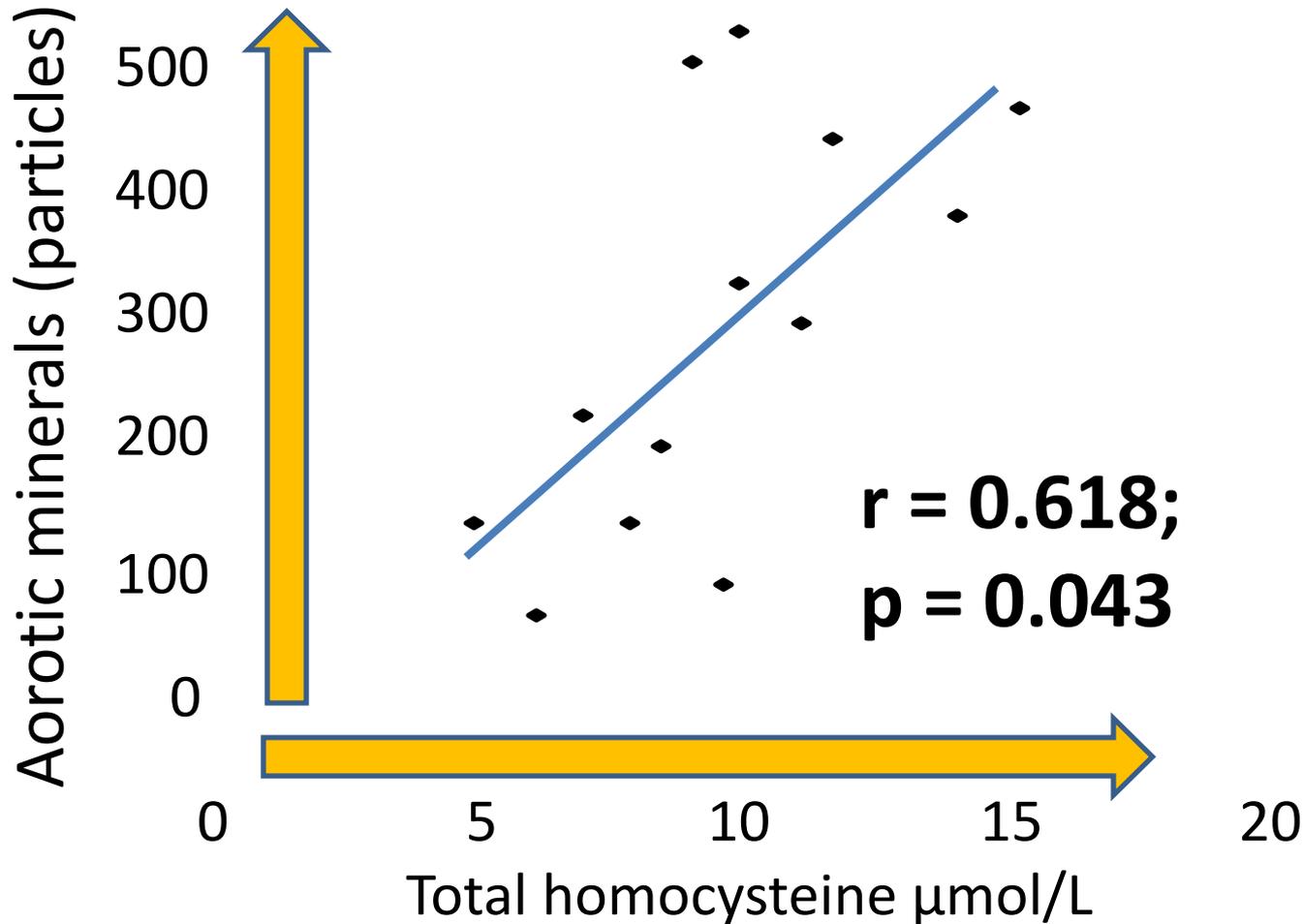
Van Campenhout A., et al. *Atherosclerosis*. 2009;202(2): 557–566

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

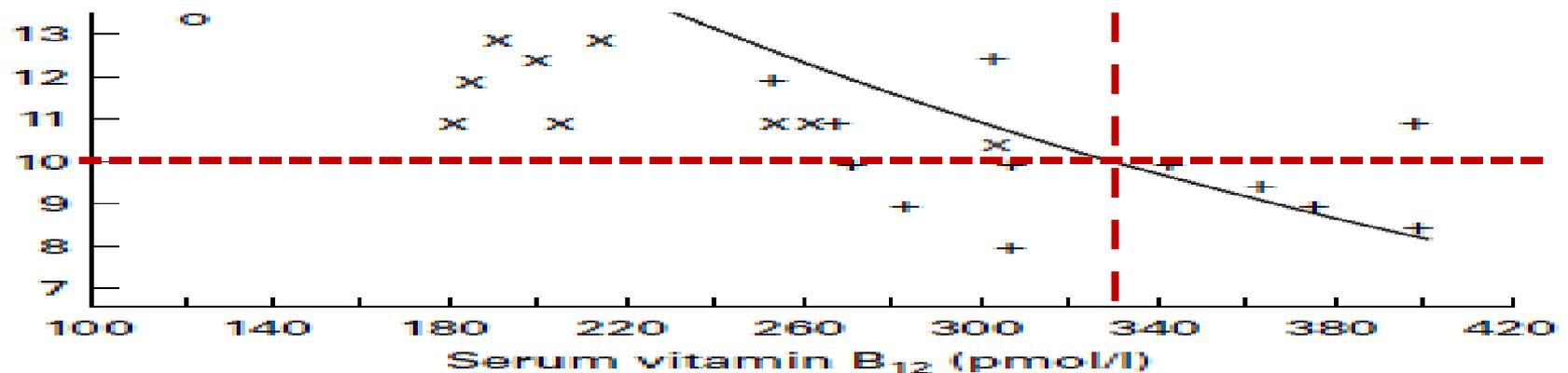


**What is the ideal  
vitamin B12 and  
homocysteine  
status?**

# 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

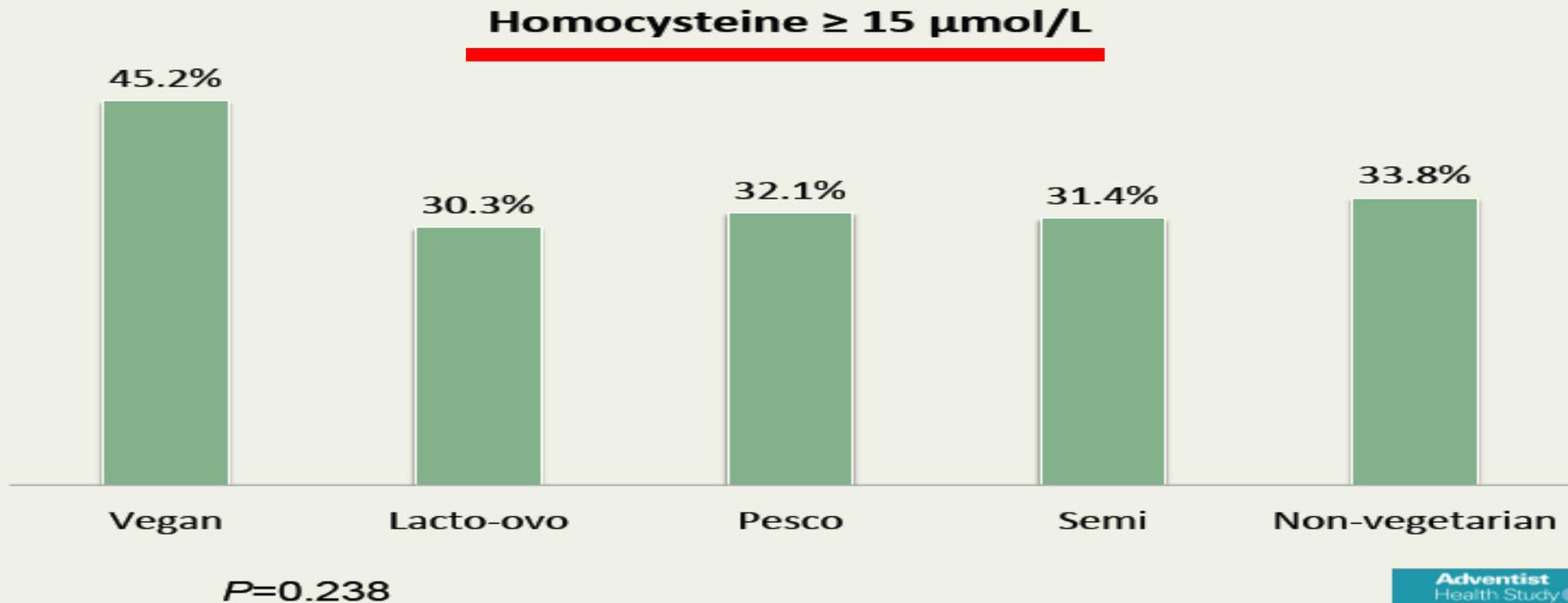
Diet	Plasma tHcy ( $\mu\text{mol/l}$ )				Serum vitamin B <sub>12</sub> (pmol/l)			
	Mean	SD	n	P	Mean	SD	n	P
Omnivores	11.03	2.89	14		303	72	14	
Lactovegetarians or lacto-ovovegetarians	13.91	3.15	15	<0.025	209	47	15	<0.005
Vegans	16.41	4.80	9	<0.005	172	59	9	<0.005



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

Haddad E. Lecture presentation. 6<sup>th</sup> 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. KWOK<sup>1</sup>, P. CHOOK<sup>1,2</sup>, M. QIAO<sup>1</sup>, L. TAM<sup>1</sup>, Y.K.P. POON<sup>1</sup>, A.T. AHUJA<sup>3</sup>, J. WOO<sup>1</sup>,  
D.S. CELERMAJER<sup>4</sup>, K.S. WOO<sup>1,2</sup>

- 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. CELERMAJER<sup>4</sup>, K.S. WOO<sup>1,2</sup>

**Carotid intima-media thickness**

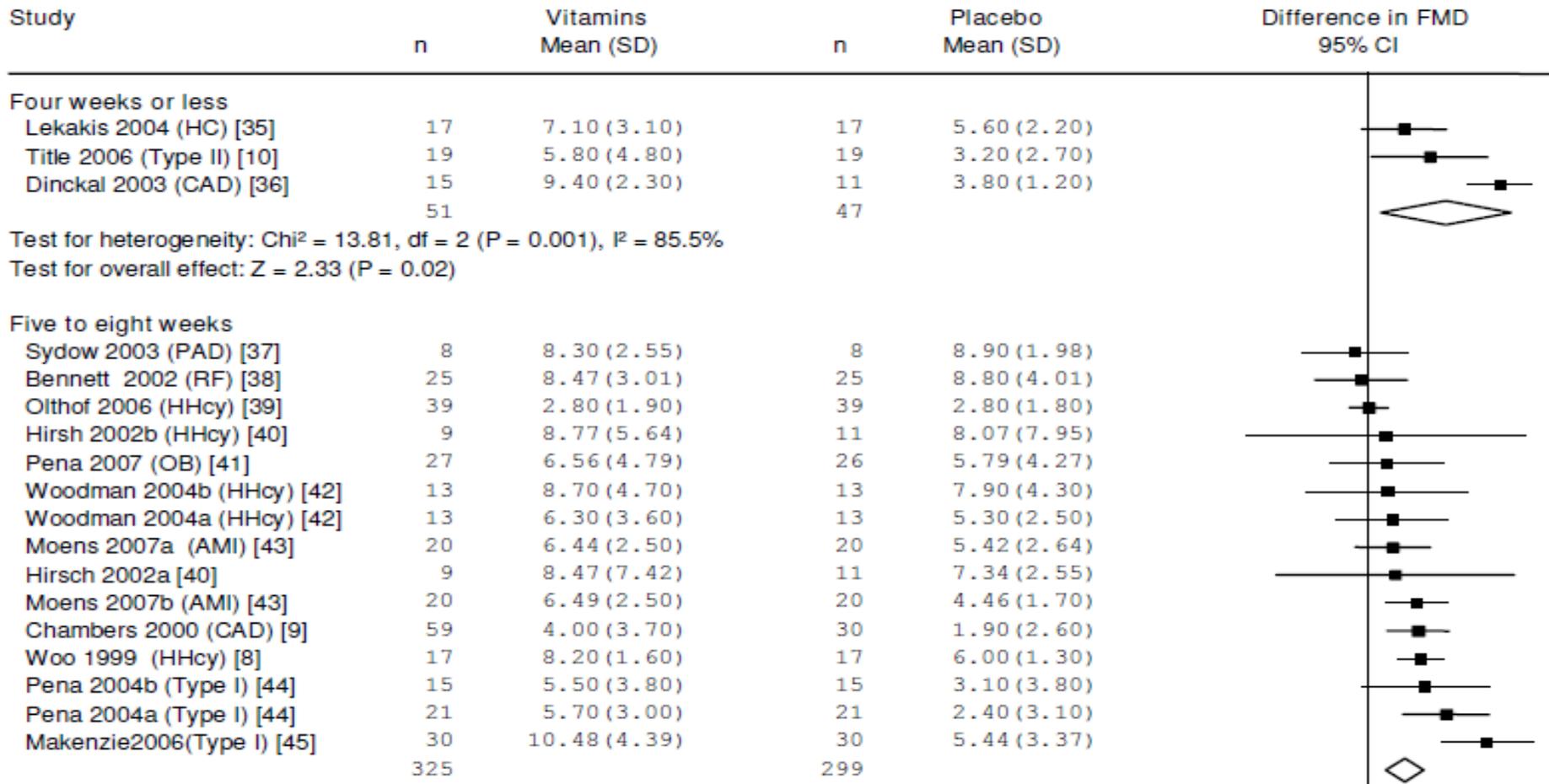
**Branchial flow-mediated dialation**

**“(...) 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.

