

**Non-invasive** Management  
of  
Cardiovascular Disease  
( Nutrition & Exercise )

# Disclosures

- None

# **Non-invasive** Management of Cardiovascular Disease

## 1. Nutrition

- a. ACC/AHA 2015 to 2020 Dietary Guidelines for Americans
- b. Protein — How much does one need ?

## 2. Exercise

- a. How Much
- b. What Type



**Non-invasive** Management  
of  
Cardiovascular Disease  
( Nutrition & Exercise )

## REFERENCES

1. Voit, C. (1881) Physiologie des allgemeinen stoffwechsels und der Ernährung. In: Handbuch der Physiologie (Hermann, L., ed.), vol. 6, Pt. 1, pp. 1–575. Vogel, Leipzig, Germany.
2. Atwater, W. O. (1887) How food nourishes the body. Century Mag. 34: 237–251. Wilbur Atwater, born in 1844 in New England and by 1885, a professor of chemistry at Wesleyan University
3. ACC/AHA 2015 to 2020 Dietary Guidelines for Americans
4. Shikany JM, Safford MM, Newby PK, et al. Southern dietary pattern is associated with hazard of acute coronary heart disease - Reasons for Geographic and Racial Differences in Stroke (REGARDS) Study. Circulation 2015;132:804–14.
5. The effect of physical activity or exercise on key biomarkers in atherosclerosis—a systematic review. Palmefors H, DuttaRoy S, Rundqvist B, Börjesson M. Atherosclerosis 2014;235:150–61.

# The 2015 to 2020 Dietary Guidelines for Americans

JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY

VOL. 69, NO. 9, 2017 ISSN 0735-1097/

## ACC's Prevention of Cardiovascular Disease Council

Andrew M. Freeman, MD, Pamela B. Morris, MD, Neal Barnard, MD, **Caldwell B. Esselstyn, MD**, Emilio Ros, MD, PHD, Arthur Agatston, MD, Stephen Devries, MD, **James O'Keefe, MD**, Michael Miller, MD, **Dean Ornish**, MD, **Kim Williams, MD**, Penny Kris-Etherton, PHDm

# **Diet** and **Inactivity** contribute to four of the top ten Leading Causes of Death

<b><i>Heart Disease</i></b>	710,760
<b><i>Cancer</i></b>	553,091
<b><i>Stroke</i></b>	167,661
Chronic lower respiratory ds	122,009
Accidents	97,900
<b><i>Diabetes</i></b>	69,301
Pneumonia and Influenza	65,313
Alzheimer's	49,558
Nephritis	37,251
Septicemia	31,224

National Center for Health Statistics, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. "Deaths, Percent of Total Deaths, and Death Rates for the 15 Leading Causes of Death in 5-Year Age Groups, by Race and Sex: United States, 2000." Hyattsville, MD: CDC, 2002.



# Leading Causes of Death

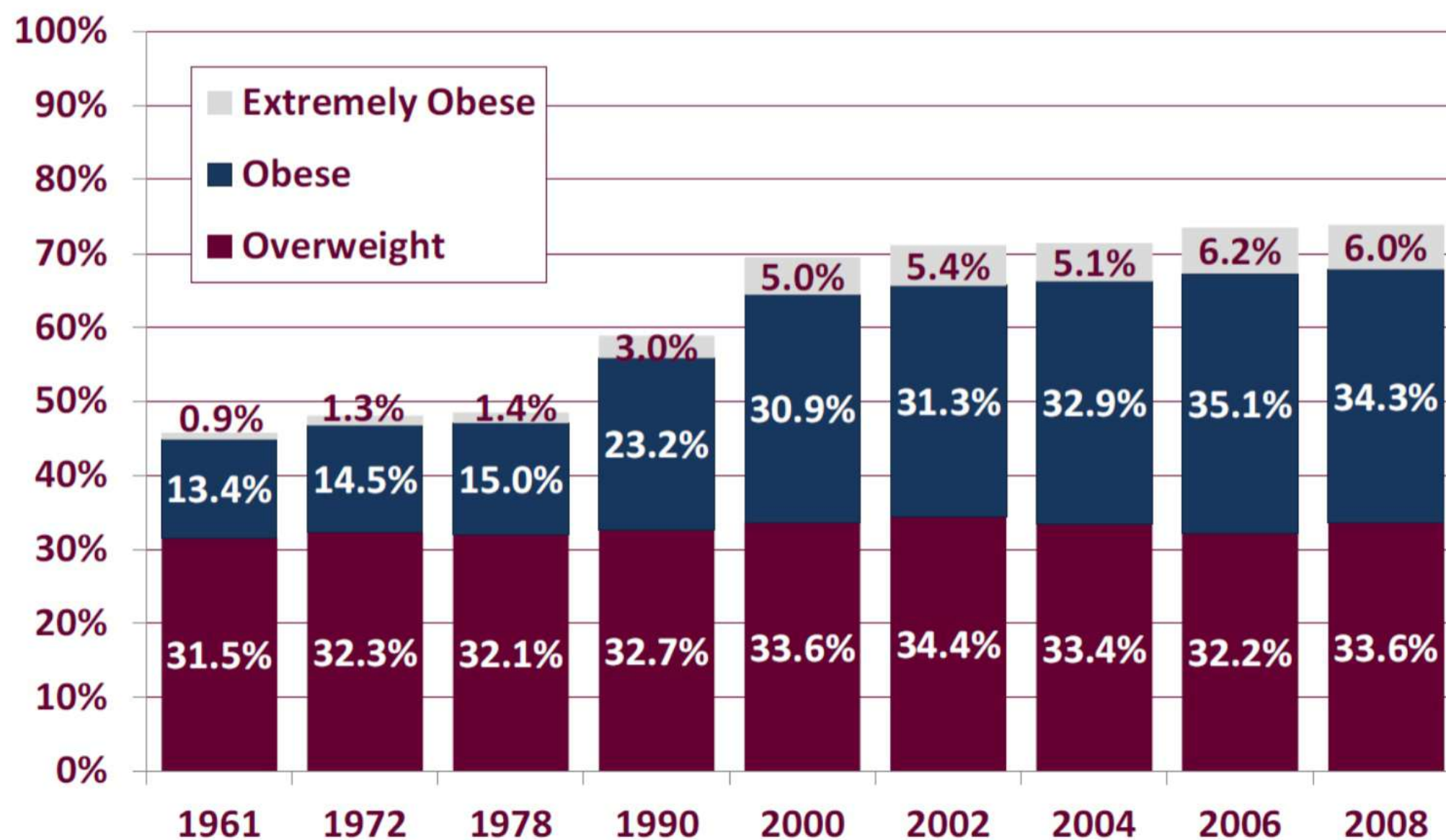
Data are for the U.S.

## Number of deaths for leading causes of death

- Heart disease: 655,381
- Cancer: 599,274
- Accidents (unintentional injuries): 167,127
- Chronic lower respiratory diseases: 159,486
- Stroke (cerebrovascular diseases): 147,810
- Alzheimer's disease: 122,019
- Diabetes: 84,946
- Influenza and pneumonia: 59,120
- Nephritis, nephrotic syndrome, and nephrosis: 51,386
- Intentional self-harm (suicide): 48,344

Source: [Mortality in the United States, 2018, data table for figure 2](#)

## The Rise in Obesity in the U.S. 1961-2008 (ages 20 and older)



Source: [http://www.cdc.gov/NCHS/data/hestat/obesity\\_adult\\_07\\_08/obesity\\_adult\\_07\\_08.pdf](http://www.cdc.gov/NCHS/data/hestat/obesity_adult_07_08/obesity_adult_07_08.pdf)



# Medical Complications of Obesity

Pulmonary disease  
abnormal function  
obstructive sleep apnea  
hypoventilation syndrome

Nonalcoholic fatty liver  
disease  
steatosis  
steatohepatitis  
cirrhosis

Gall bladder disease

Gynecologic abnormalities  
abnormal menses  
infertility  
polycystic ovarian syndrome

Osteoarthritis

Skin

Gout

Idiopathic intracranial  
hypertension

Stroke

Cataracts

Coronary heart disease

Diabetes

Dyslipidemia

Hypertension

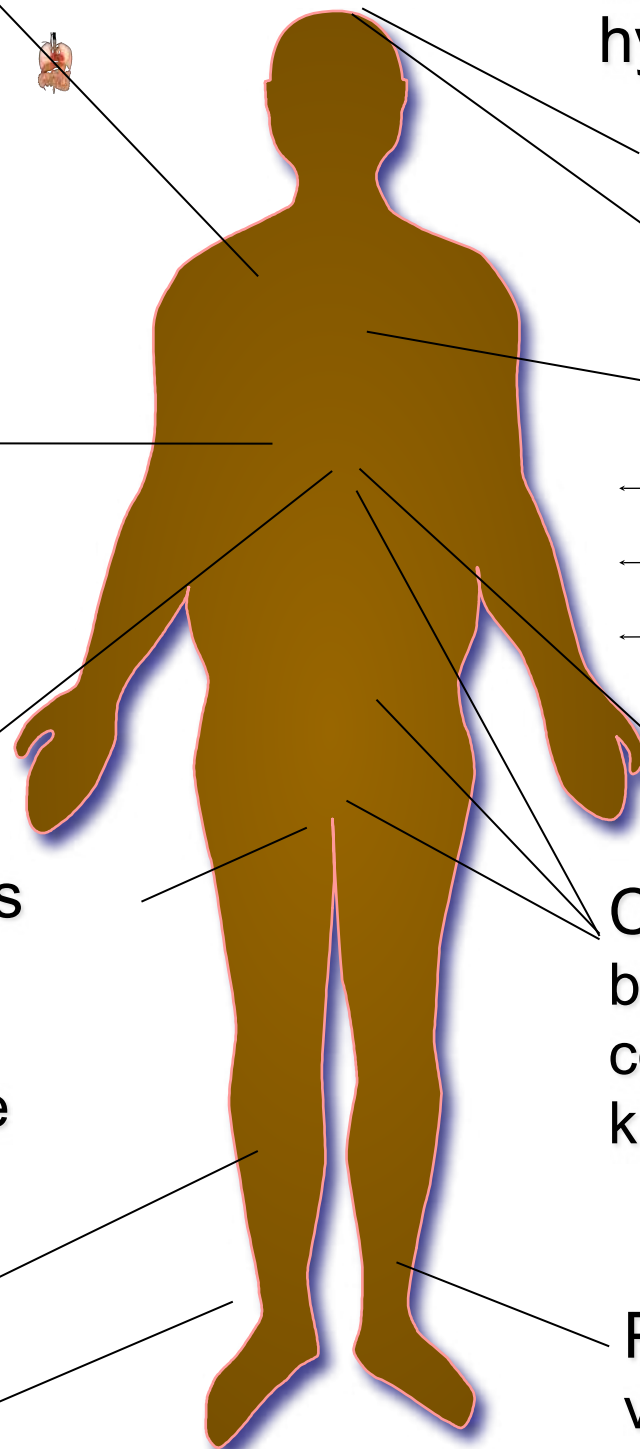
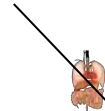
Severe pancreatitis

Cancer

breast, uterus, cervix  
colon, esophagus, pancreas  
kidney, prostate

Phlebitis

venous stasis



## **Current investments** to Promote Healthy Eating and Physical Activity are **Insufficient**

- Funding for the Division of Nutrition and Physical Activity at CDC in FY15: \$47.6 million.
- The Hershey Company spends 12 times that amount to promote its chocolate and other products (\$562 million).
- Amount food companies spend on advertising each year: \$33 billion
- Amount the food industry spends on advertising and promotions to children each year: U\$1.8 billion





[www.StrangeCosmos.com](http://www.StrangeCosmos.com)



# Changing Portion Sizes

1954  
Burger King



2.8 oz  
202 calories

2004



4.3 oz  
310 calories

1955  
McDonald's



2.4 oz  
210 calories

2004



7 oz  
610 calories

1900  
Hershey's



2 oz  
297 calories

2004



7 oz  
1,000 calories

1916  
Coca-Cola



6.5 fluid oz  
79 calories

2004



16 fluid oz  
194 calories

1950s  
Movie popcorn



3 cups  
174 calories

2004



21 cups (buttered)  
1,700 calories

# The 2015 to 2020 Dietary Guidelines for Americans

- 3 healthy eating patterns
- 1) the Healthy U.S.-style Eating Pattern
- 2) the Healthy Mediterranean-style Eating Pattern
- 3) the Healthy Vegetarian Eating Pattern





## CHAPTER 1

# Key Elements of Healthy Eating Patterns

## A Closer Look Inside Healthy Eating Patterns

### In this section:

1. Food Groups
2. Other Dietary Components

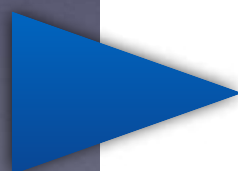
The following sections describe a healthy eating pattern and how following such a pattern can help people meet the Guidelines and its Key Recommendations. Throughout, it uses the Healthy U.S.-Style Eating Pattern as an example to illustrate the specific amounts and limits for food groups and other dietary components that make up healthy eating patterns. The Healthy U.S.-Style Eating Pattern is one of three USDA Food Patterns and is based on the types and proportions of foods Americans typically consume, but in nutrient-dense forms and appropriate amounts. Because calorie needs vary based on age, sex, height, weight, and level of physical activity (see [Appendix 2. Estimated Calorie Needs per Day, by Age, Sex, and Physical Activity Level](#)), the pattern has been provided at 12 different calorie levels (see [Appendix 3. USDA Food Patterns: Healthy U.S.-Style Eating Pattern](#)). The 2,000-calorie level of the Pattern is shown in [Table 1-1](#).

The Healthy U.S.-Style Eating Pattern is the same as the primary USDA Food Patterns of the *2010 Dietary Guidelines*. Two additional USDA Food Patterns—the Healthy Mediterranean-Style Eating Pattern and the Healthy Vegetarian Eating Pattern—are found at the end of this chapter and reflect other styles of eating (see [Appendix 4. USDA Food Patterns: Healthy Mediterranean-Style Eating Pattern](#) and [Appendix 5. USDA Food Patterns: Healthy Vegetarian Eating Pattern](#)). These three patterns are examples of healthy eating patterns that can be adapted based on cultural and personal preferences. The USDA Food Patterns also can be



# Healthy U.S.-Style Eating Pattern: Recommended Amounts of Food From Each Food Group at 12 Calorie Levels

Calorie Level of Pattern <sup>a</sup>	2,400	2,600	2,800	3,000	3,200
Food Group <sup>b</sup>					
<b>Vegetables</b>	<b>3 c-eq</b>	<b>3½ c-eq</b>	<b>3½ c-eq</b>	<b>4 c-eq</b>	<b>4 c-eq</b>
Dark-green vegetables (c-eq/wk)	2	2½	2½	2½	2½
Red and orange vegetables (c-eq/wk)	6	7	7	7½	7½
Legumes (beans and peas) (c-eq/wk)	2	2½	2½	3	3
Starchy vegetables (c-eq/wk)	6	7	7	8	8
Other vegetables (c-eq/wk)	5	5½	5½	7	7
<b>Fruits</b>	<b>2 c-eq</b>	<b>2 c-eq</b>	<b>2½ c-eq</b>	<b>2½ c-eq</b>	<b>2½ c-eq</b>
<b>Grains</b>	<b>8 oz-eq</b>	<b>9 oz-eq</b>	<b>10 oz-eq</b>	<b>10 oz-eq</b>	<b>10 oz-eq</b>
Whole grains <sup>d</sup> (oz-eq/day)	4	4½	5	5	5
Refined grains (oz-eq/day)	4	4½	5	5	5
<b>Dairy</b>	<b>3 c-eq</b>	<b>3 c-eq</b>	<b>3 c-eq</b>	<b>3 c-eq</b>	<b>3 c-eq</b>
<b>Protein Foods</b>	<b>6½ oz-eq</b>	<b>6½ oz-eq</b>	<b>7 oz-eq</b>	<b>7 oz-eq</b>	<b>7 oz-eq</b>
Seafood (oz-eq/wk)	10	10	10	10	10
Meats, poultry, eggs (oz-eq/wk)	31	31	33	33	33
Nuts seeds, soy products (oz-eq/wk)	5	5	6	6	6



# Healthy Mediterranean-Style Eating Pattern: Recommended Amounts of Food From Each Food Group at 12 Calorie Levels

Calorie Level of Pattern <sup>a</sup>	2,400	2,600	2,800	3,000	3,200
Food Group <sup>b</sup>					
<b>Vegetables</b>	3 c-eq	3½ c-eq	3½ c-eq	4 c-eq	4 c-eq
Dark-green vegetables (c-eq/wk)	2	2½	2½	2½	2½
Red and orange vegetables (c-eq/wk)	6	7	7	7½	7½
Legumes (beans and peas) (c-eq/wk)	2	2½	2½	3	3
Starchy vegetables (c-eq/wk)	6	7	7	8	8
Other vegetables (c-eq/wk)	5	5½	5½	7	7
<b>Fruits</b>	2½ c-eq	2½ c-eq	3 c-eq	3 c-eq	3 c-eq
<b>Grains</b>	8 oz-eq	9 oz-eq	10 oz-eq	10 oz-eq	10 oz-eq
Whole grains <sup>d</sup> (oz-eq/day)	4	4½	5	5	5
Refined grains (oz-eq/day)	4	4½	5	5	5
<b>Dairy<sup>e</sup></b>	2½ c-eq	2½ c-eq	2½ c-eq	2½ c-eq	2½ c-eq
<b>Protein Foods</b>	7½ oz-eq	7½ oz-eq	8 oz-eq	8 oz-eq	8 oz-eq
Seafood (oz-eq/wk) <sup>f</sup>	16	17	17	17	17
Meats, poultry, eggs (oz-eq/wk)	31	31	33	33	33
Nuts, seeds, soy products (oz-eq/wk)	5	5	6	6	6

# Healthy Vegetarian Eating Pattern: Recommended Amounts of Food From Each Food Group at 12 Calorie Levels

Calorie Level of Pattern <sup>a</sup>	2,400	2,600	2,800	3,000	3,200
<b>Food Group<sup>b</sup></b>					
<b>Vegetables</b>	3 c-eq	3½ c-eq	3½ c-eq	4 c-eq	4 c-eq
Dark-green vegetables (c-eq/wk)	2	2½	2½	2½	2½
Red and orange vegetables (c-eq/wk)	6	7	7	7½	7½
Legumes (beans and peas) (c-eq/wk) <sup>d</sup>	2	2½	2½	3	3
Starchy vegetables (c-eq/wk)	6	7	7	8	8
Other vegetables (c-eq/wk)	5	5½	5½	7	7
<b>Fruits</b>	2 c-eq	2 c-eq	2½ c-eq	2½ c-eq	2½ c-eq
<b>Grains</b>	8½ oz-eq	9½ oz-eq	10½ oz-eq	10½ oz-eq	10½ oz-eq
Whole grains <sup>e</sup> (oz-eq/day)	4½	5	5½	5½	5½
Refined grains (oz-eq/day)	4	4½	5	5	5
<b>Dairy</b>	3 c-eq	3 c-eq	3 c-eq	3 c-eq	3 c-eq
<b>Protein Foods</b>	4 oz-eq	4½ oz-eq	5 oz-eq	5½ oz-eq	6 oz-eq
Eggs (oz-eq/wk)	3	3	4	4	4
Legumes (beans and peas) (oz-eq/wk) <sup>d</sup>	8	9	10	11	12



# Mediterranean Diet

Ancel Keys, initially famous for his 'K' rations used by soldiers during World War II, was a prominent researcher during the 1950s–1990s. He is also well known for his Seven Countries Study[14] and his assertion that saturated fat increases plasma cholesterol,[15] therefore implicating a detrimental effect of animal-based foods on heart disease. He introduced **the Mediterranean diet that he described as “mainly vegetarian”**.

# Mediterranean Diet

Keys also said in 1995, that the Mediterranean diet had already shifted “far from the ... pattern” that existed when he did his research and went on to say that “un- happily, the current changes in Mediterranean countries ***[more meat and dairy]*** tend to destroy the health virtues of the diet”.

Keys A. Mediterranean diet and public health: personal reflections. Am J Clin Nutr 1995; 61(6 Suppl): 1321S-1323S

**SPECIAL FOCUS ISSUE: CARDIOVASCULAR HEALTH PROMOTION**

**THE PRESENT AND FUTURE: COUNCIL PERSPECTIVES**

# Trending Cardiovascular Nutrition Controversies



Andrew M. Freeman, MD,<sup>a</sup> Pamela B. Morris, MD,<sup>b</sup> Neal Barnard, MD,<sup>c</sup> Caldwell B. Esselstyn, MD,<sup>d</sup> Emilio Ros, MD, PhD,<sup>e</sup> Arthur Agatston, MD,<sup>f</sup> Stephen Devries, MD,<sup>g,h</sup> James O'Keefe, MD,<sup>i</sup> Michael Miller, MD,<sup>j</sup> Dean Ornish, MD,<sup>k</sup> Kim Williams, MD,<sup>l</sup> Penny Kris-Etherton, PhD<sup>m</sup>

## ABSTRACT

The potential cardiovascular benefits of several trending foods and dietary patterns are still incompletely understood, and nutritional science continues to evolve. However, in the meantime, a number of controversial dietary patterns, foods, and nutrients have received significant media exposure and are mired by hype. This review addresses some of the more popular foods and dietary patterns that are promoted for cardiovascular health to provide clinicians with accurate information for patient discussions in the clinical setting. (J Am Coll Cardiol 2017;69:1172-87)

© 2017 by the American College of Cardiology Foundation.



**TABLE 1 Clinical Recommendations for Specific Dietary Patterns, Foods, and Nutrients**

Nutrition/Food Item	Level of Evidence Available and Included in This Paper	Recommendations for Patients
Dietary pattern with added fats, fried food, eggs, organ and processed meats, and sugar-sweetened beverages ( <i>Southern</i> diet pattern)	Prospective studies	Avoid
Dietary cholesterol	RCTs and prospective studies along with meta-analyses	Limit
Canola oil	RCT meta-analyses show improvement in lipids but no prospective studies or RCTs for CVD outcomes	In moderation
Coconut oil	RCT meta-analyses and observational studies on adverse lipid effects. No prospective studies or RCTs for CVD outcomes	Avoid
Sunflower oil	No prospective studies or RCTs for CVD outcomes	In moderation
Olive oil	RCTs supporting improved CVD outcomes	In moderation
Palm oil	RCTs and observation studies showing worsened CVD outcomes	Avoid
Antioxidant-rich fruits and vegetables	RCTs and observational studies showing improved CVD outcomes and improvements in blood lipids	Frequent
Antioxidant supplements	RCTs and prospective and observational studies show potential harm	Avoid
Nuts	RCT and large prospective and meta-analysis studies showing improved CVD outcomes	In moderation
Green leafy vegetables	Large meta-analyses and variably sized observational studies as well as a large prospective study	Frequent
Protein from plant sources	Large observational and prospective studies	Frequent
Gluten-containing foods	Observational studies and RCTs	Avoid if sensitive or allergic

CVD = cardiovascular disease; RCT = randomized controlled trial.

- The Southern Pattern  
HIGH IN

- Added Fats
- Fried food
- Eggs
- Organ and processed meats
- Sugar- sweetened beverages,

- # The Southern Pattern

Associated with Higher Likelihood

- smoking
- higher mean body mass index (BMI)
- waist circumference
- higher prevalence of hypertension
- dyslipidemia
- type 2 diabetes mellitus (T2DM).



- # The Southern Pattern

















<6 years of follow-up  
Associated With

- 56% increase in acute CHD events
- 50% increase in mortality in patients with chronic kidney disease
- 30% increase in stroke

Shikany JM, Safford MM, Newby PK, et al. Southern dietary pattern is associated with hazard of acute coronary heart disease - Reasons for Geographic and Racial Differences in Stroke (REGARDS) Study. Circulation 2015;132:804–14.

## CENTRAL ILLUSTRATION Evidence for Cardiovascular Health Impact of Foods Reviewed

### Summary of heart-harmful and heart-healthy foods/diets

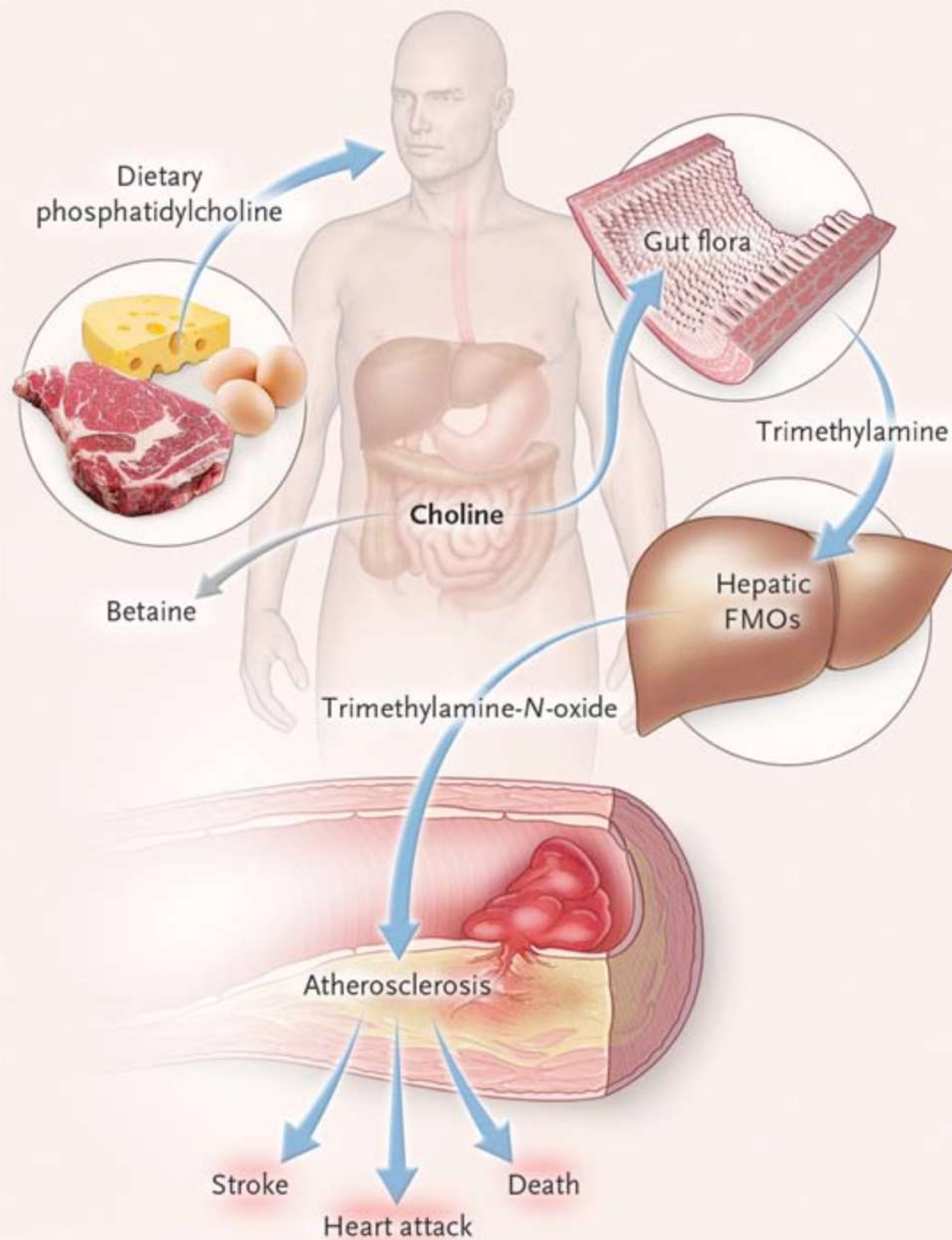
 Evidence of harm; limit or avoid	 Inconclusive evidence; for harm or benefit	 Evidence of benefit; recommended
 <b>Coconut oil and palm oil</b> are high in saturated fatty acids and raise cholesterol	 <b>Sunflower oil and other liquid vegetable oils</b>	 <b>Extra-virgin olive oil</b> reduces some CVD outcomes when consumed in moderate quantities
 <b>Eggs</b> have a serum cholesterol-raising effect	 <b>High-dose antioxidant supplements</b>	 <b>Blueberries and strawberries</b> (>3 servings/week) induce protective antioxidants
 <b>Juicing</b> of fruits/vegetables with pulp removal increases caloric concentration*	 <b>Juicing</b> of fruits/vegetables without pulp removal*	 30 g serving of <b>nuts/day</b> . Portion control is necessary to avoid weight gain.†
 <b>Southern diets</b> (added fats and oils, fried foods, eggs, organ and processed meats, sugar-sweetened drinks)	 <b>Gluten-containing foods</b> (for people without gluten-related disease)	 <b>Green leafy vegetables</b> have significant cardio-protective properties when consumed daily
		 <b>Plant-based proteins</b> are significantly more heart-healthy compared to animal proteins

Freeman, A.M. *et al.* J Am Coll Cardiol. 2017;69(9):1172-87.

This figure summarizes the foods discussed in this paper that should be consumed often, and others that should be avoided from a cardiovascular health perspective.

\*It is important to note that juicing becomes less of a benefit if calorie intake increases because of caloric concentration with pulp removal. †Moderate quantities are required to prevent caloric excess.





ORIGINAL ARTICLE

# Intestinal Microbial Metabolism of Phosphatidylcholine and Cardiovascular Risk

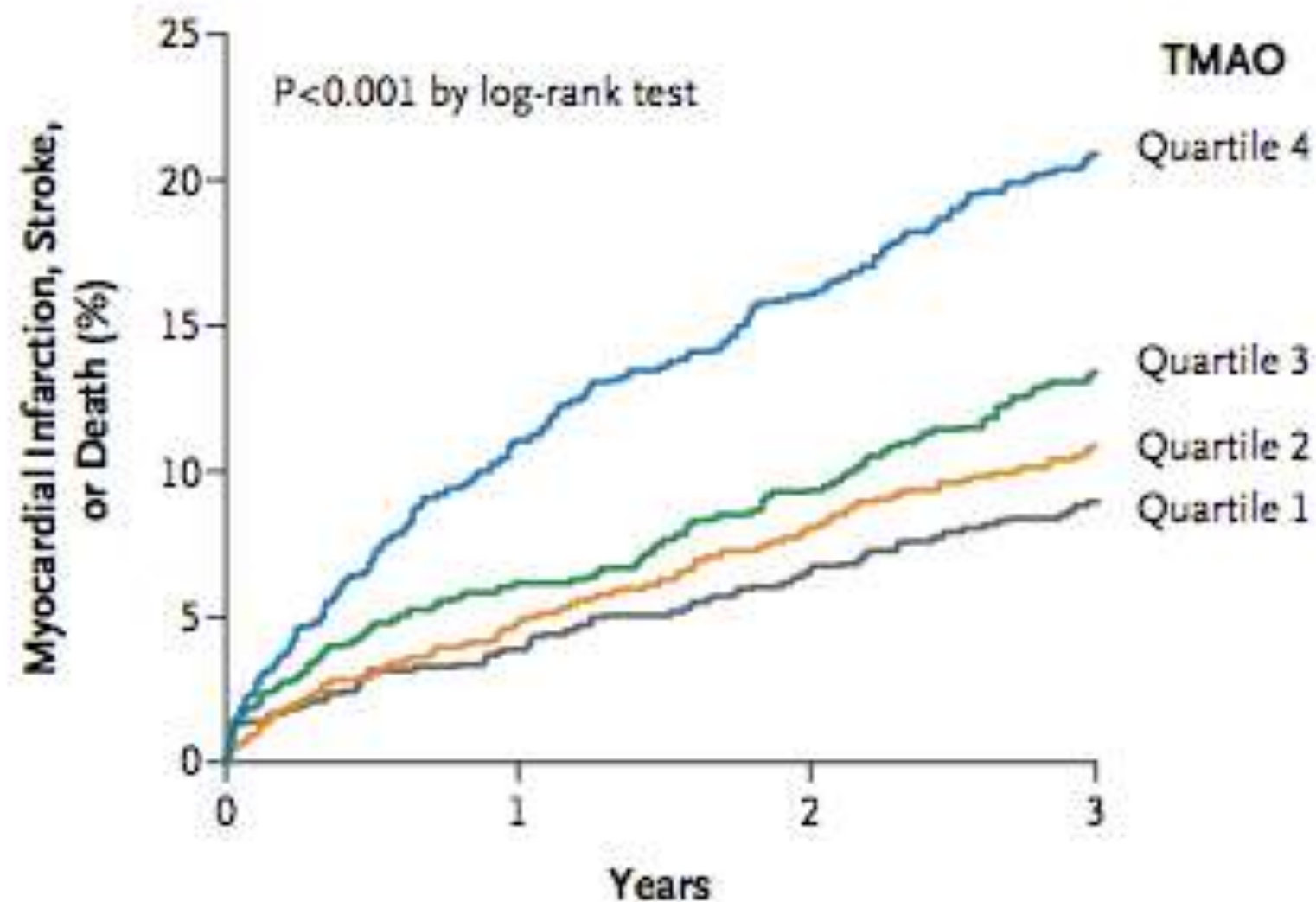
W.H. Wilson Tang, M.D., Zeneng Wang, Ph.D., Bruce S. Levison, Ph.D., Robert A. Koeth, B.S., Earl B. Britt, M.D., Xiaoming Fu, M.S., Yuping Wu, Ph.D., and Stanley L. Hazen, M.D., Ph.D.

April 25, 2013

VOL. 368 NO. 17

 [Audio Summary](#) ▾





**No. at Risk**

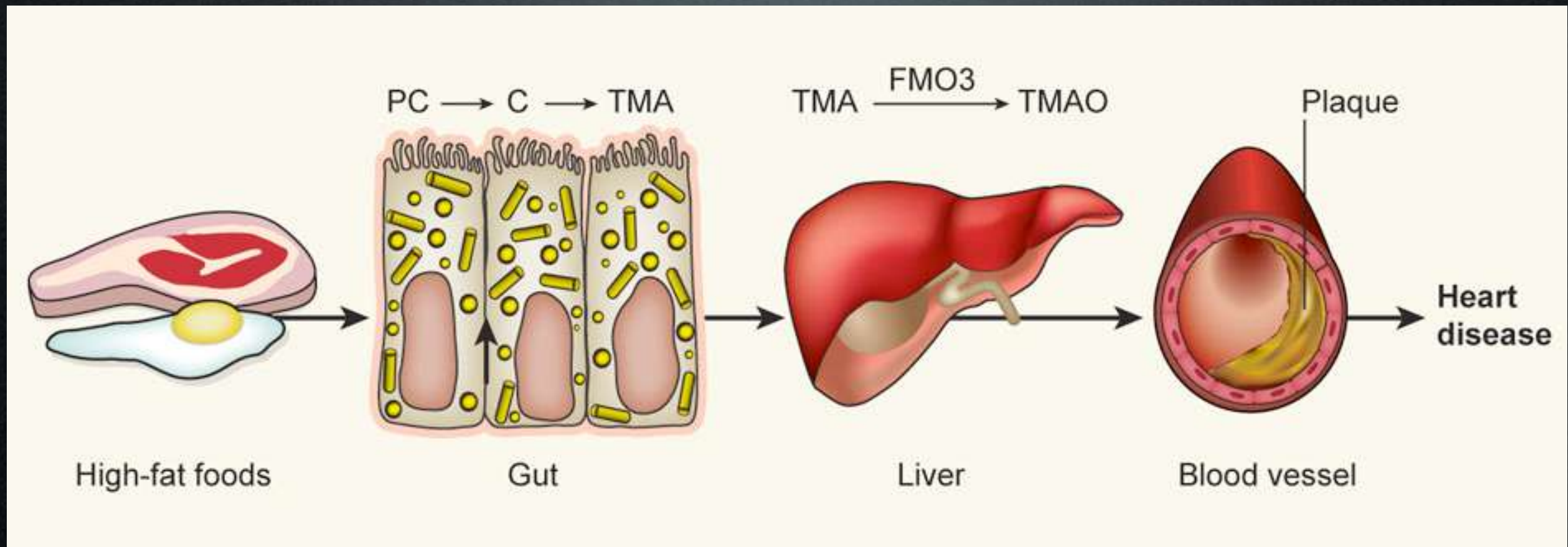
Quartile 1	1001	933	869	827
Quartile 2	998	940	884	843
Quartile 3	1003	938	888	835
Quartile 4	1005	913	849	791

**Figure 2.** Kaplan–Meier Estimates of Major Adverse Cardiovascular Events, According to the Quartile of TMAO Level.

Data are shown for 4007 participants in the clinical-outcomes study. The P value is for all comparisons.

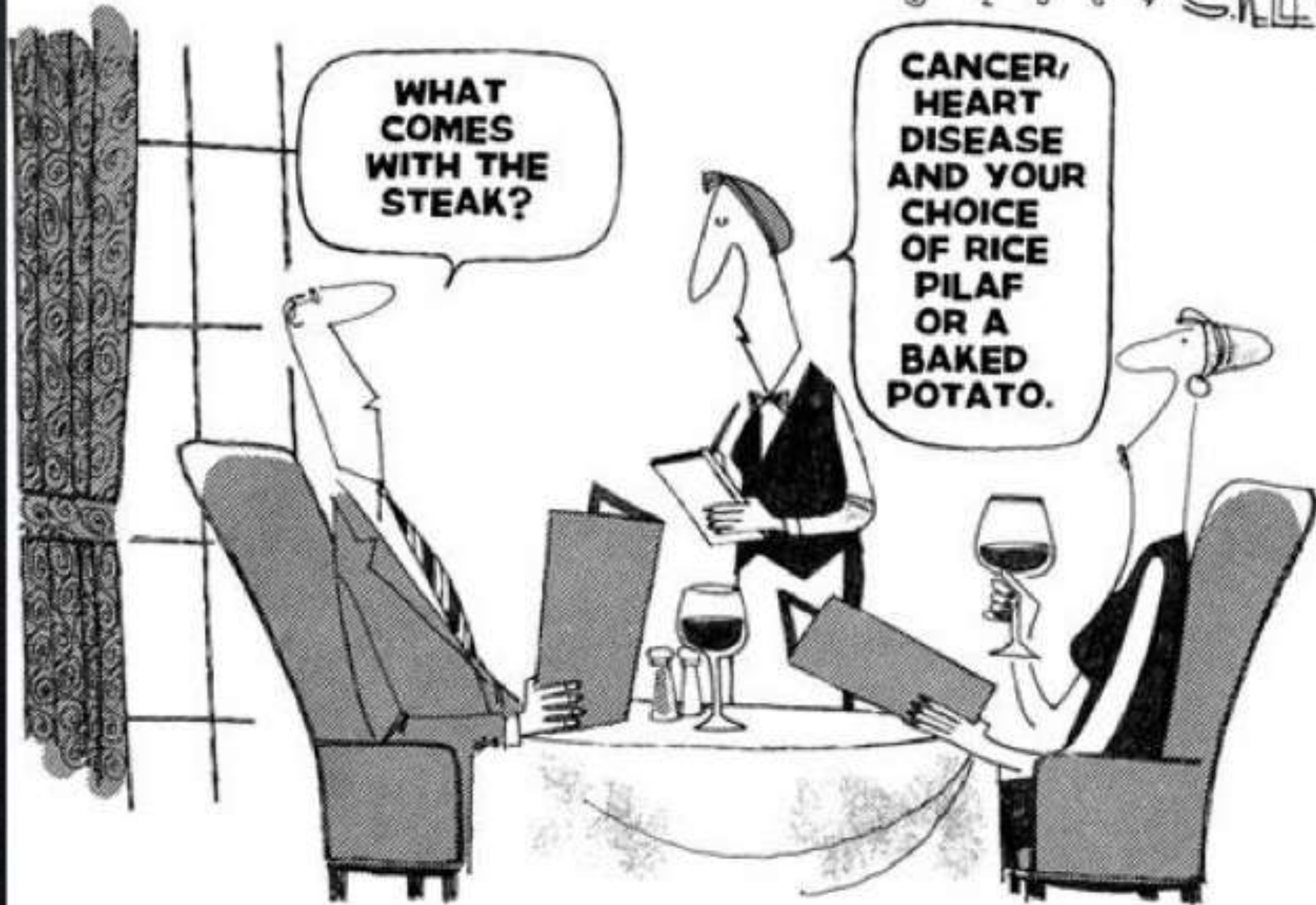
# PROBIOTICS & LECITHIN ? = CORONARY ATHEROSCLEROSIS

*L. paracasei* :) vs. *L. rhamnosus* :(



[7] Martin FP, Wang Y, Sprenger N, Yap IK, Lundstedt T, Lek P, Rezzi S, Ramadan Z, van Bladeren P, Fay LB, Kochhar S, Lindon JC, Holmes E, Nicholson JK. Probiotic modulation of symbiotic gut microbial-host metabolic interactions in a humanized microbiome mouse model. *Mol Syst Biol.* 2008;4:157. Epub 2008 Jan 15.





# HOW MUCH PROTEIN

- Dr Carl Voit - German Physiologist (1831-1908 )
- Observation Study of Working Affluent Individuals ( Measured their protein intake )
- Voit Standard - 118 grams / day
- Other Studies based on Observation and Hypotheses of the Affluent ( 100 -189 grams/day



# A Short History of Nutritional Science: Part 2 (1885–1912)

Kenneth J. Carpenter

Department of Nutritional Sciences, University of California, Berkeley, CA 97420–3104

American Society for Nutritional Sciences. J. Nutr. 133: 975–984, 2003.

Voit believed that people with sufficient income to choose the diet that they preferred would instinctively select a diet containing the amount of protein that they needed to remain healthy and productive. His estimate was that the average German workman doing moderate physical work chose to eat 118 g protein/d, and this became his standard

Atwater found that

American workmen were generally better off and ate more.

They also, he thought, worked harder and he set his standard at 125 g/d

1. Voit, C. (1881) Physiologie des allgemeinen stoffwechsels und der Ernährung. In: Handbuch der Physiologie (Hermann, L., ed.), vol. 6, Pt. 1, pp. 1–575. Vogel, Leipzig, Germany.

2. Atwater, W. O. (1887) How food nourishes the body. Century Mag. 34: 237–251. Wilbur Atwater, born in 1844 in New England and by 1885, a professor of chemistry at Wesleyan University



# Average Adult Protein Intake Grams/Day

Atkins - type High Protein Diet	200 - 400 grams/ day
Typical Eskimo Diet	200 - 400
Voit Standard	118
Late 1800 Scientists	100 - 189
Typical Western Diet	100 - 160
USDA/WHO	33 -71
Typical Rural Asian Rice-based Diet	40 - 60
<b>Chittenden</b>	35 - 50
McDougall/ Esselstyn / Ornish / Fuhrman	30 - 80

# Protein per 3 ounce Serving

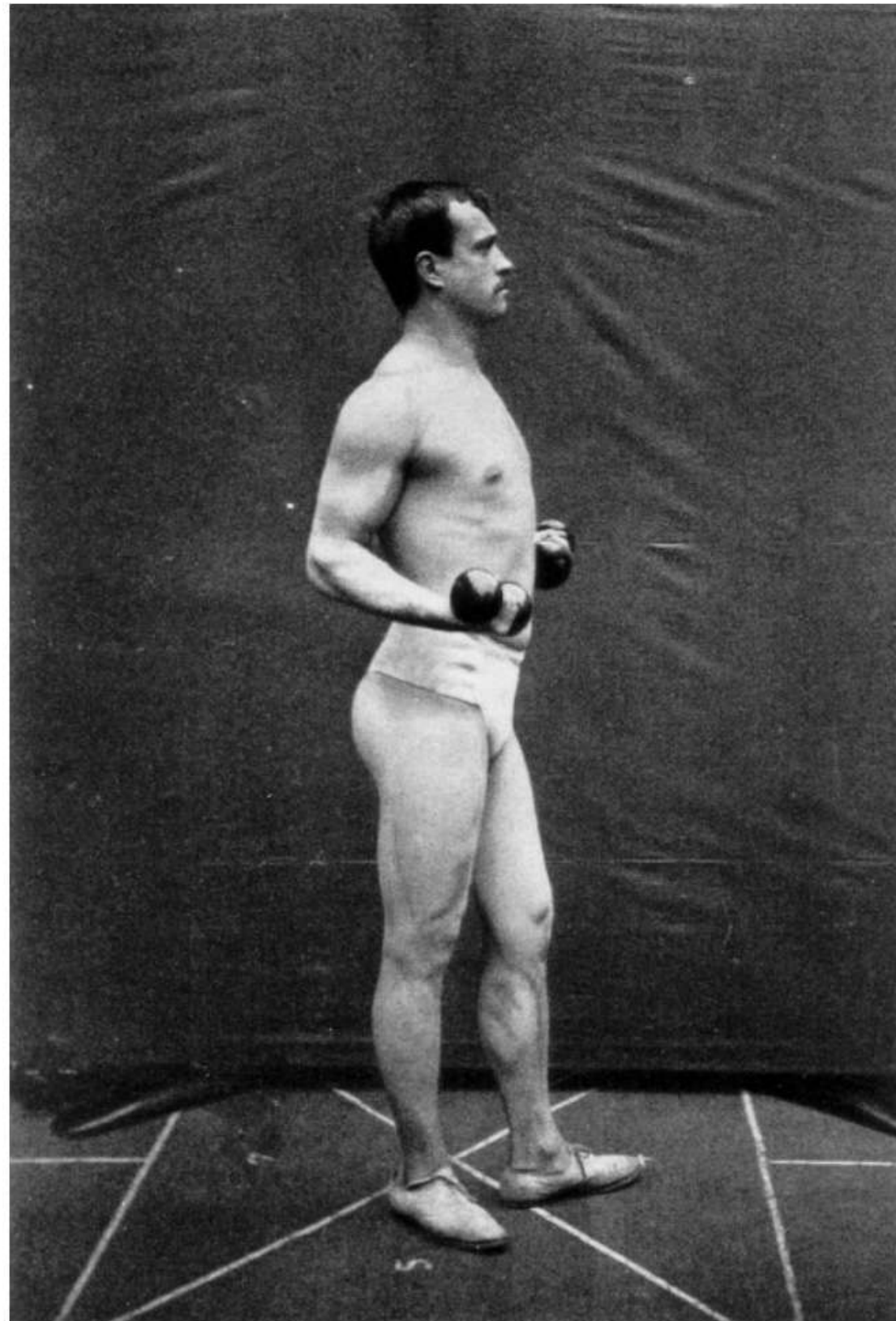
Salmon	23
Steak	23
Chicken	27



# HOW MUCH PROTEIN

( Prof Russell Henry Chittenden )

- Professor of Physiological Chemistry - Yale University
- Physiological Economy in Nutrition, with special reference to the minimal protein requirement of the healthy man, an experimental study. New York: Frederick A Stokes Company, 1904
- Concluded - 35 to 50 grams of protein/day allowed adults to maintain health and physical fitness



**FIGURE 1** A photograph used by Chittenden to demonstrate that his subjects remained in good physical condition while consuming a relatively low protein diet. Reproduced from (5).



# The Gladiator Diet

## Archeology

A publication of the Archaeological Institute of America  
Volume 61 Number 6, November/December 2008

Compared to the average inhabitant of Ephesus, gladiators ate more plants and very little animal protein. The vegetarian diet had nothing to do with poverty or animal rights.

The biggest revelation to come out of the Ephesus cemetery is what kept the gladiators alive--a vegetarian diet rich in carbohydrates, with the occasional calcium supplement.



***Vegetarian Diet and Muscle Mass***



# PROTEIN QUALITY

## (There is a MISCONCEPTION )

- Layette Mendel & Thomas Osborne — 1914 - Animal Protein is Superior to Plant Protein
- Protein requirements of Laboratory Rats; Animal vs Plant Sources
- Rats grew faster and larger - Animal sources
- Such studies led to designation of Meat, Milk, and Eggs as “Class A”; Plants as class “B”
- Vegetable sources were insufficient in amount of some amino acids required by Rats?

# PROTEIN QUALITY ( MISCONCEPTION )

- Dietary needs of Rats vs Humans is Quite different.
- Rats grow rapidly - Adult size in 6 months; Humans - Adult Size in 17 years
- Different Protein Requirements - Rat Breast Milk is 10 times higher in protein concentration than Human Breast Milk
- Dr. William Rose - University of Illinois - 1940's determined 10 amino acids essential for Rats.
- Dr. William Rose - 1942 - only 8 of the amino acids essential to Rats were essential to humans.



# Protein Quality

## ( Current Understanding )

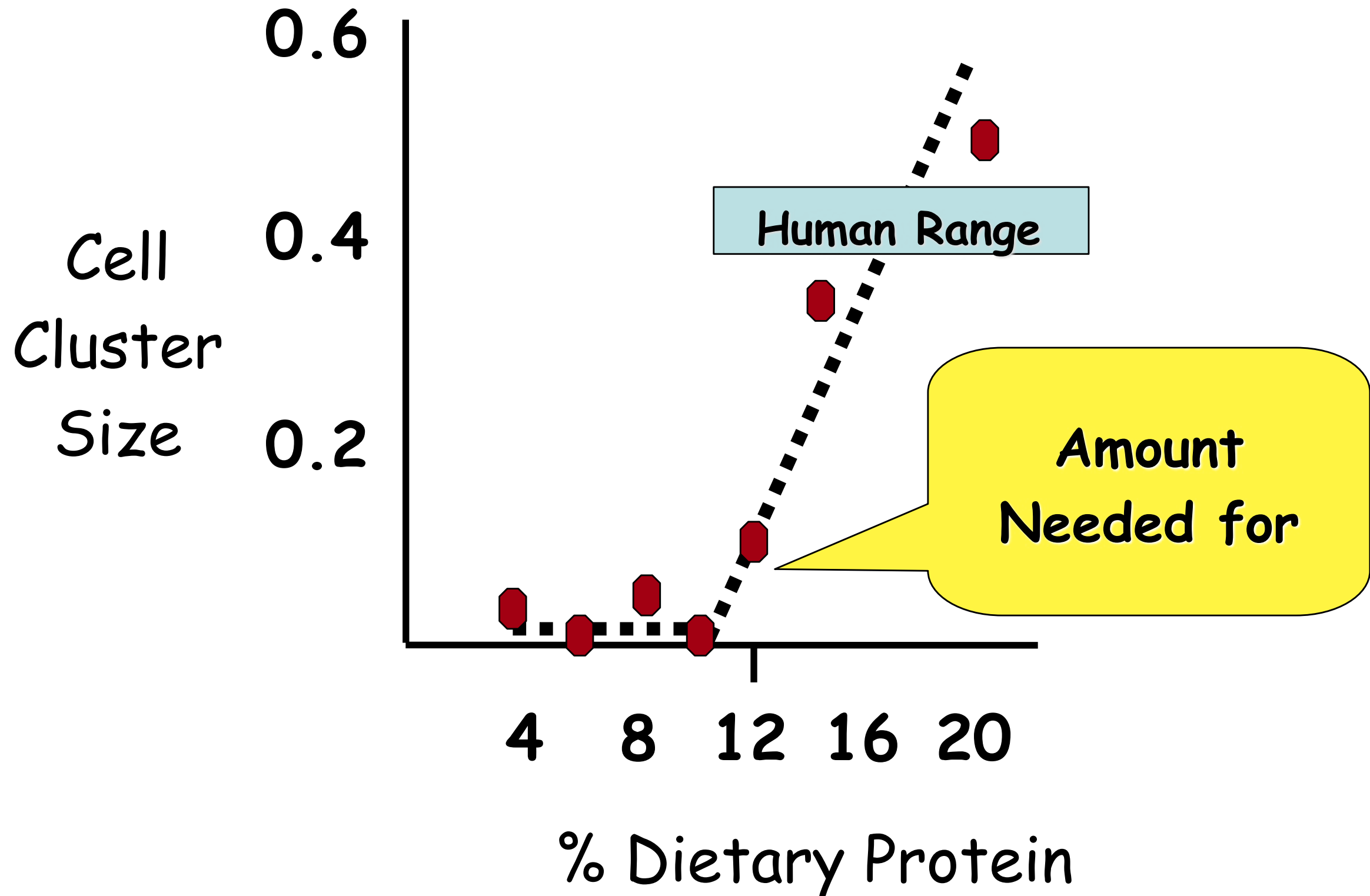
- Whole Grains, Vegetables, Legumes and Nuts all contain essential and nonessential amino acids
- One does not have to consciously combine certain plant foods in meal ( “complementary proteins” )

- Plant Protein & Animal Protein: Do They Differentially Affect Disease Risk



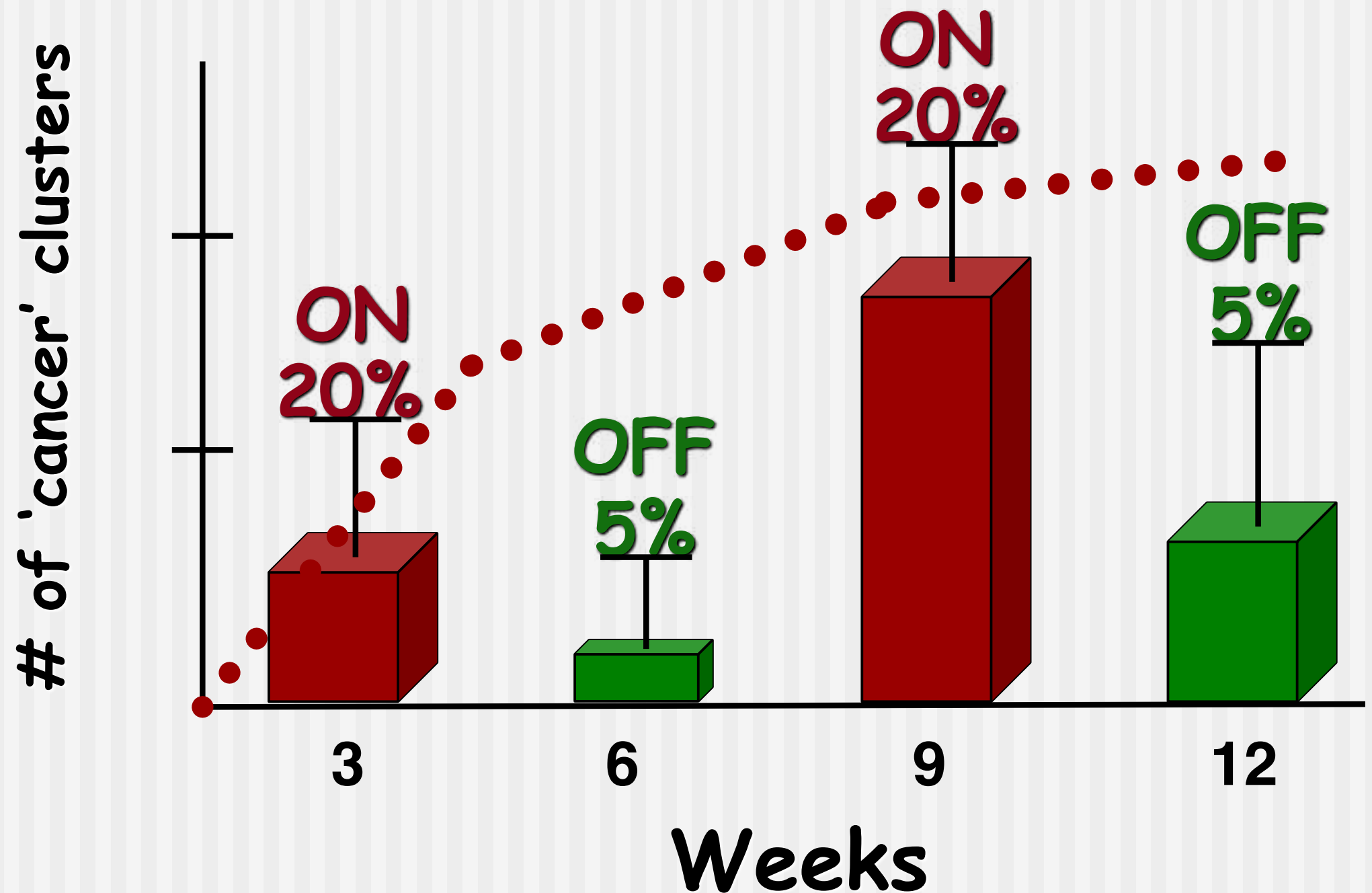
# Dietary Protein and **EARLY** Cancer

(Dunaif and Campbell, J. Nutr. 1987)



# Dietary Protein and **EARLY** Cancer

(Youngman and Campbell, J. Nutr., 1991, Nutr. Cancer, 1992)





# Dietary Protein and **LATE** Cancer

(Youngman and Campbell, Carcinogenesis, 1992)

Chemical effect = cancer **INITIATION**

Protein effect = cancer **GROWTH**

Protein, %		No. Animals	Tumor Severity*
5	all <b>living</b> at 100 wks.	60	248 <sup>a</sup>
20	all <b>dead</b> at 100 wks.	58	<b>3321<sup>c</sup></b>

\* % incidence x tumor weight.

# **SAME** Whole Food, Plant-Based Diet Prevents, Suspends and/or Cures All

(All supported by published peer-reviewed research)

- Cancers
- Heart Diseases
- Multiple Sclerosis
- Macular Degeneration
- Hypertension
- Acne

**And Promotes  
Superior**



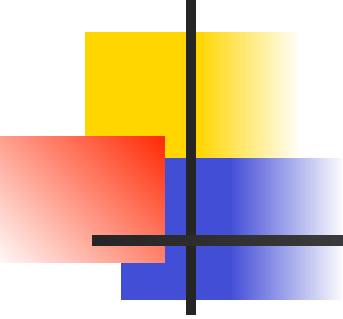
# Low carbohydrate-high protein diet and incidence of cardiovascular diseases in Swedish women: prospective cohort study

BMJ 2012; 344 doi: <http://dx.doi.org/10.1136/bmj.e4026> (Published 26 June 2012)

Cite this as: BMJ 2012;344:e4026

- **Participants** From a random population sample, 43396 Swedish women, aged 30-49 years at baseline, completed an extensive dietary questionnaire and were followed-up for an average of 15.7 years.
- **Conclusions** Low carbohydrate-high protein diets, used on a regular basis and without consideration of the nature of carbohydrates or the source of proteins, are associated with increased risk of cardiovascular disease.

# Associations of Dietary Protein with Disease and Mortality in a Prospective Study of Postmenopausal Women

- 
- Some weight loss diets promote protein intake; however, the association of protein with disease is unclear. In 1986, 29,017 postmenopausal Iowa women without cancer, coronary heart disease (CHD), or diabetes were followed prospectively for 15 years for cancer incidence and mortality from CHD, cancer, and all causes.
  - CHD mortality was associated with red meats (risk ratio = 1.44, 95% CI: 1.06, 1.94) and dairy products (risk ratio = 1.41, 95% CI: 1.07, 1.86) when substituted for servings per 1,000 kcal (4.2 MJ) of carbohydrate foods. Long-term adherence to high-protein diets, without discrimination toward protein source, may have potentially adverse health consequences.

American Journal of Epidemiology  
Copyright © 2005 by the Johns Hopkins Bloomberg School of Public Health All rights reserved

Vol. 161, No. 3

*Printed in U.S.A.*

## **Associations between the percent of calories derived from specific foods and CHD mortality in the 20 Countries Study\***

<b>Food Source</b>	<b>Correlation Coefficient†</b>
<b>Butter</b>	<b>0.546</b>
<b>All dairy products</b>	<b>0.619</b>
<b>Eggs</b>	<b>0.592</b>
<b>Meat and poultry</b>	<b>0.561</b>
<b>Sugar and syrup</b>	<b>0.676</b>
<b>Grains, fruits, and starchy and nonstarchy vegetables</b>	<b>-0.633</b>

\*1973 data, all subjects. From Stamler J: Population studies.  
In Levy R: Nutrition, Lipids, and CHD. New York, Raven, 1979.

†All coefficients are significant at the  $P < 0.05$  level.



In a 1961 epidemiological survey of dietary practices and heart disease mortality among 24 countries done by Connor and Connor; cholesterol consumption, an indicator for animal protein-based foods, was highly correlated with heart disease ( $r = 0.83$ ,  $P < 0.01$ ).

In a later 1972 study this finding was confirmed by showing that the highest correlation of dietary nutritional factors with coronary heart disease was for animal protein ( $r = 0.78$ ), even more than total fat ( $r = 0.68$ ) and animal fat ( $r = 0.63$ ). There was an inverse correlation between vegetable protein and coronary heart disease ( $r = -0.40$ ).



# Calcium Loss & Cancer Growth From Protein Concentrates

- Isolated Soy Protein - as damaging as meat protein to the bones

The American Journal of Clinical Nutrition, Apr. 2005 vol. 81 no. 4, 916-922; Spence, et.al.

- 40 grams of isolated soy or cow-milk protein concentrate increases levels of Insulin-like Growth Factor 1 ( cancer-promoting growth hormone ) IGF1

Journal of Clinical Endocrinology & Metabolism, March 1, 2003 vol. 88 no. 3 1048-1054; Arjmandi et.al.

- One Soy Chicken Patty plus Two Soy Burger Patties = 40 grams of Isolated Protein



# Adulterated Soy

- Defatted soy flour
- Organic textured soy flour
- Textured vegetable protein
- Isolated soy protein
- Soy protein concentrates
- Soy concentrates
- Partially Hydrogenated Soy

# Common Foods with Protein Isolates (**AVOID**)

Desserts & Snacks	Serving	Grams of Protein
Cliff Builder's Bar	1 Bar	20
Cliff Bar (Oatmeal,Raisin,Walnut)	1 Bar	10
Revival Soy Bars	1 Bar	17
Atkins Nutrition Bars	1 Bar	21
ZonePerfect Nutrition Bars	1 Bar	15
Revival Soy Shakes	1 Shake	20

# Common Foods with Protein Isolates (**AVOID**)

Meats	Serving	Grams of Protein
Morningstar Farms Sausage Patties	1 Patty	10
Boca Breakfast Links	1 Link	8
Gardenburger Chik'n Grill	1 Patty	13
Boca Burger Original	1 Burger	13
Boca Ground Burger	2 Ounces	13
Boca Chicken Patties	1 Patty	11
Smart Dogs	1 Dog	9
Boca Chili	1 Serving	20



# Common Foods with Protein Isolates (**AVOID**)

Cheeses	Serving	Grams of Protein
Veggie Shreds (Cheese)	2 Ounces	6
Boca Pizza	1 Slice	13

# Common Foods with Protein Isolates (**AVOID**)

Tofu with Added Isolates	Serving	Grams of Protein
Lite Tofu	3 Ounces	5

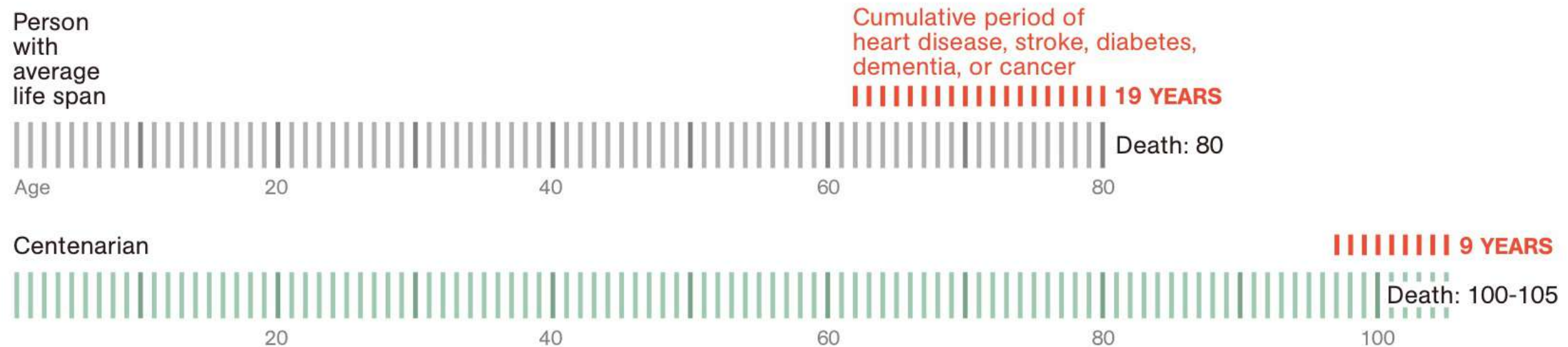
# Common Foods with Protein Isolates (**AVOID**)

Flour	Serving	Grams of Protein
Benesoy High Protein Soy Flour	1 Ounce	15



# Getting to 100 candles

Centenarians reach that milestone because they're healthier, by virtue of genetics, common sense, or luck. In people with an average life span, diseases of old age strike earlier and last longer.



# Eat What The Centenarians Eat

## The Blue Zones by Dan Buettner

They all have an active lifestyle

- Sardinia
  - Red wine
  - Goat's milk and cheese
  - Plant based diet with small amounts of red meat
- Loma Linda, CA- Seven Day Adventists
  - Nuts
  - "Vegetarian" with an early, light dinner
  - Drink plenty of water

- Okinawa, Japan
  - hara hachi bu : stop eating when 80% full
  - Plant based diet with soy
- Costa Rica
  - Hard water: calcium in the water
  - Largest meal in the morning
  - Lightly salted corn tortillas, beans and squash
  - Not much meat, some eggs



- **Ikaria, Greece:** currently being researched
  - The Ikarian variation of the Mediterranean Diet is high in vegetables & beans, and low in meat & sugar; not much fish, but high in potatoes
  - Wild Greens
  - Herbal Teas
  - Goat's milk

# The Ideal Human Diet ( WFPB LifeStyle )

- Plant-based foods in forms as close to their natural state as possible (“whole” foods)
- Eat a variety of vegetables, fruits, raw nuts and seeds, beans and legumes, and whole grains
- Avoid heavily processed foods and animal products
- Stay away from added salt, oil, and sugar.
- Aim to get 80 percent of your calories from carbohydrates,
- Aim to get 10 percent of your calories from fat
- Aim to get 10 percent of your calories from protein
- Excerpt From - “Whole”, T. Colin Campbell & Howard Jacobson

GLASBERGEN

© Randy Glasbergen.  
www.glasbergen.com



**“What fits your busy schedule better,  
exercising one hour a day or being  
dead 24 hours a day?”**



Prevention and Control  
of Atherosclerosis  
( Exercise and Physical Activity )

# *The effect of physical activity or exercise on key biomarkers in atherosclerosis—a systematic review.*

Palmefors H, DuttaRoy S, Rundqvist B, Börjesson M. Atherosclerosis 2014;235:150–61.

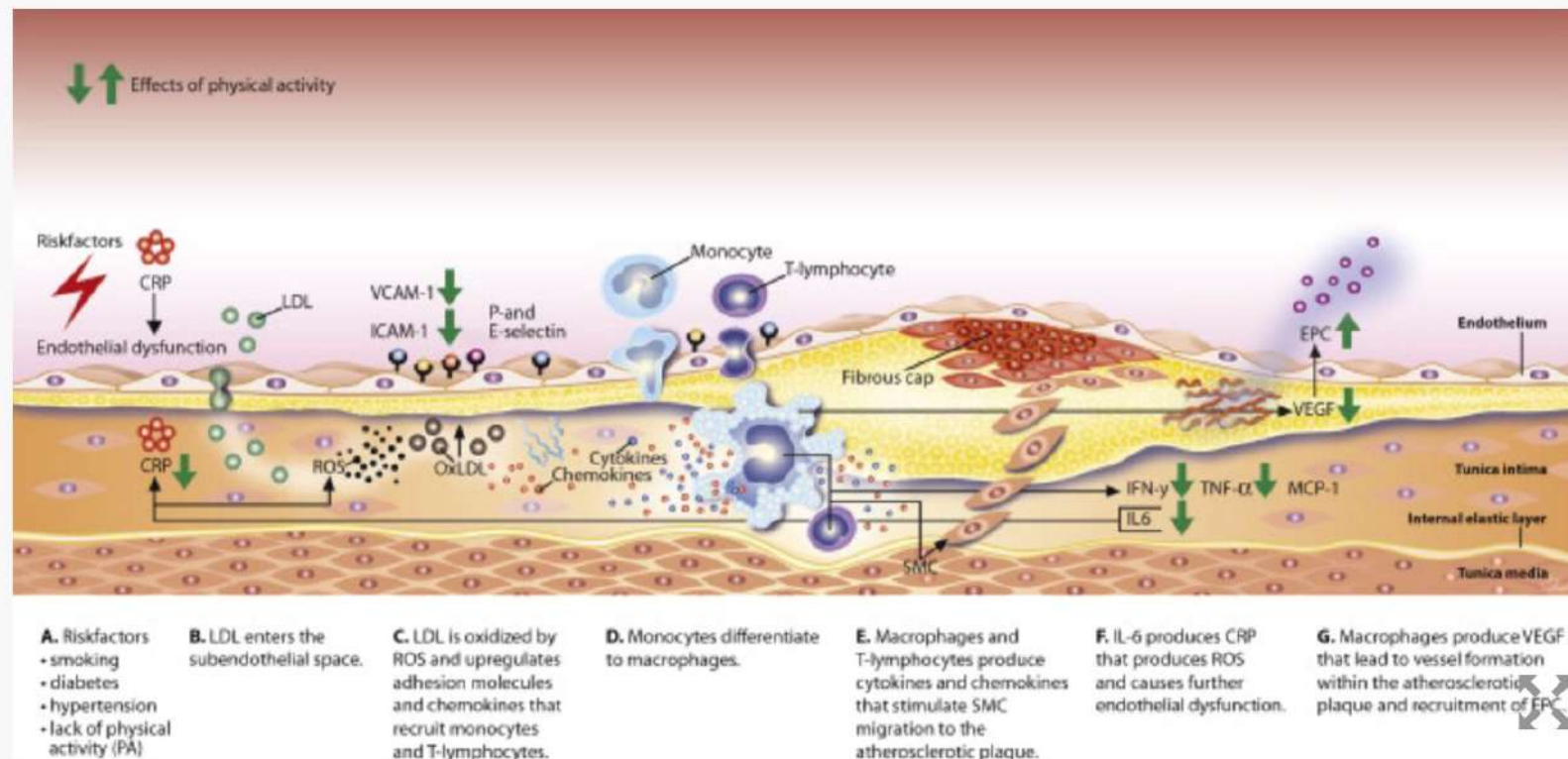


Fig. 2

An overview over the effect of physical activity/exercise on key factors in the atherosclerotic process. The green arrows show the effect of physical activity/exercise (CRP = C-reactive protein, LDL = low density lipoprotein, OxLDL = oxidized LDL, ROS = reactive oxygen species, VCAM-1 = vascular cell adhesion molecule-1, ICAM-1 = intracellular adhesion molecule-1, MCP-1 = monocyte chemoattractant protein-1, IFN- $\gamma$  = interferon- $\gamma$ , TNF- $\alpha$  = tumor necrosis factor- $\alpha$ , IL-6 = interleukin-6, EPC = endothelial progenitor cell, VEGF = vascular endothelial growth factor).



# ***The effect of physical activity or exercise on key biomarkers in atherosclerosis—a systematic review.***

Palmefors H, DuttaRoy S, Rundqvist B, Börjesson M. Atherosclerosis 2014;235:150–61.

- **PA decreases the cytokines, tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ), interleukin-6 (IL-6), and interferon- $\gamma$  IFN- $\gamma$  (high, moderate and low evidence, respectively).**
- The effect of PA on chemokines; stromal derived factor-1 (SDF-1), interleukin-8 (IL-8) (insufficient evidence)
- Monocyte chemoattractant protein-1 (MCP-1) (low evidence) was inconclusive.
- **Aerobic exercise decreased the adhesion molecules, vascular cell adhesion molecule-1 (v-1) and intercellular adhesion molecule-1 (ICAM-1) (moderate and high evidence, respectively),**
- Effects of PA on E- and P-selectin were inconclusive.
- **PA decreases C-reactive protein (CRP) (high evidence).**
- **The angiogenic actors, endothelial progenitor cells (EPCs) are increased (high evidence)**



# Various Intensities of Leisure Time Physical Activity in Patients With Coronary Artery Disease: Effects on Cardiorespiratory Fitness and Progression of Coronary Atherosclerotic Lesions

Rainer Hambrecht MD, Josef Niebauer MD, Christian Marburger MD, Martin Grunze MD, Barbara Kälberer RN, Klaus Hauer, Günter Schli-  
erf MD, Wolfgang Kübler MD, FACC, Gerhard Schuler MD. JACC Volume 22, Issue 2, August 1993, Pages 468-477

# Various Intensities of Leisure Time Physical Activity in Patients With Coronary Artery Disease: Effects on Cardiorespiratory Fitness and Progression of Coronary Atherosclerotic Lesions

Rainer Hambrecht MD, Josef Niebauer MD, Christian Marburger MD, Martin Grunze MD, Barbara Kälberer RN, Klaus Hauer, Günter Schlierf MD, Wolfgang Kübler MD, FACC, Gerhard Schuler MD. JACC Volume 22, Issue 2, August 1993, Pages 468-477

- Patients undergoing cardiac catheterization were prospectively randomized
- intervention group (n = 29) participating in regular physical exercise
- control group (n = 33) receiving usual care
- Energy expenditure in leisure time physical activity was estimated from standardized questionnaires and from participation in group exercise sessions.
- After 12 months of participation, repeat coronary angiography was performed; coronary lesions were measured by digital image processing.
- Intervention Group - 15% Protein, 65% Carbohydrate, 20% Fat

Various Intensities of Leisure Time Physical Activity in Patients With Coronary Artery Disease:  
Effects on Cardiorespiratory Fitness and  
Progression of Coronary Atherosclerotic Lesions  
JACC Volume 22, Issue 2, August 1993, Pages 468-477

	Intervention Group	Control Group	Kcal/week
Regression	28%	6%	> 2000
No Change	62%	49%	> 1500
Progression	10%	41%	< 1200
Improved Cardiorespiratory Fitness			> 1400



***The effect of physical activity on mortality and cardiovascular disease in 130 000 people from 17 high-income, middle-income, and low-income countries: the PURE study. Lancet: Dec 16, 2017; 390: 2643–54***

- Both recreational and non-recreational physical activity were associated with benefits.
- Non-recreational (Transportation, Housework, Occupational )

***The effect of physical activity on mortality and cardiovascular disease in 130 000 people from 17 high-income, middle-income, and low-income countries: the PURE study. Lancet: Dec 16, 2017; 390: 2643–54***

Prospective Urban Rural Epidemiology (“PURE”) study

## **Exercise and Physical Activity** **( < 150 min vs > 150 min )**

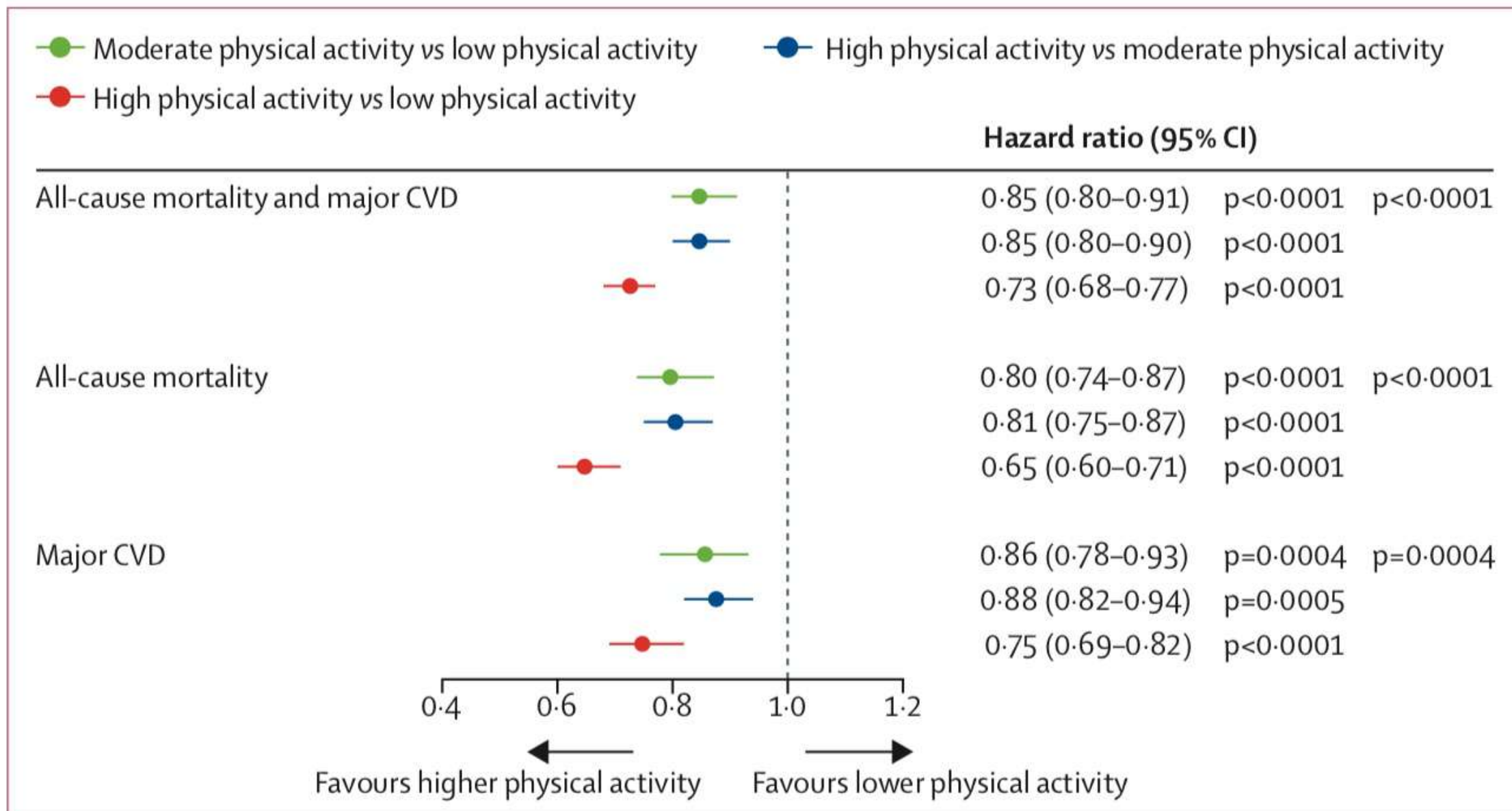
- Low physical activity (<600 metabolic equivalents [MET] × minutes per week or <150 minutes per week)
- Moderate intensity physical activity), moderate (600–3000 MET × minutes or 150–750 minutes per week)
- High physical activity (>3000 MET × minutes or >750 minutes per week)
- Higher physical activity was associated with lower risk of CVD and mortality in high-income, middle-income, and low-income countries

This table gives examples of light-, moderate-, and vigorous-intensity activity for healthy adults:

Light	Moderate	Vigorous
<3.0 METs	3.0–6.0 METs	>6.0 METs
<ul style="list-style-type: none"> <li>• Walking—slowly</li> <li>• Sitting—using computer</li> <li>• Standing—light work (cooking, washing dishes)</li> <li>• Fishing—sitting</li> <li>• Playing most instruments</li> </ul>	<ul style="list-style-type: none"> <li>• Walking—very brisk (4 mph)</li> <li>• Cleaning—heavy (washing windows, vacuuming, mopping)</li> <li>• Mowing lawn (walking power mower)</li> <li>• Bicycling—light effort (10–12 mph)</li> <li>• Badminton—recreational</li> <li>• Tennis—doubles</li> </ul>	<ul style="list-style-type: none"> <li>• Walking/hiking</li> <li>• Jogging at 6 mph</li> <li>• Shoveling</li> <li>• Carrying heavy loads</li> <li>• Bicycling fast (14–16 mph)</li> <li>• Basketball game</li> <li>• Soccer game</li> <li>• Tennis—singles</li> </ul>

*\*METs are metabolic equivalents. One MET is defined as the energy it takes to sit quietly. These MET estimates are for healthy adults.*



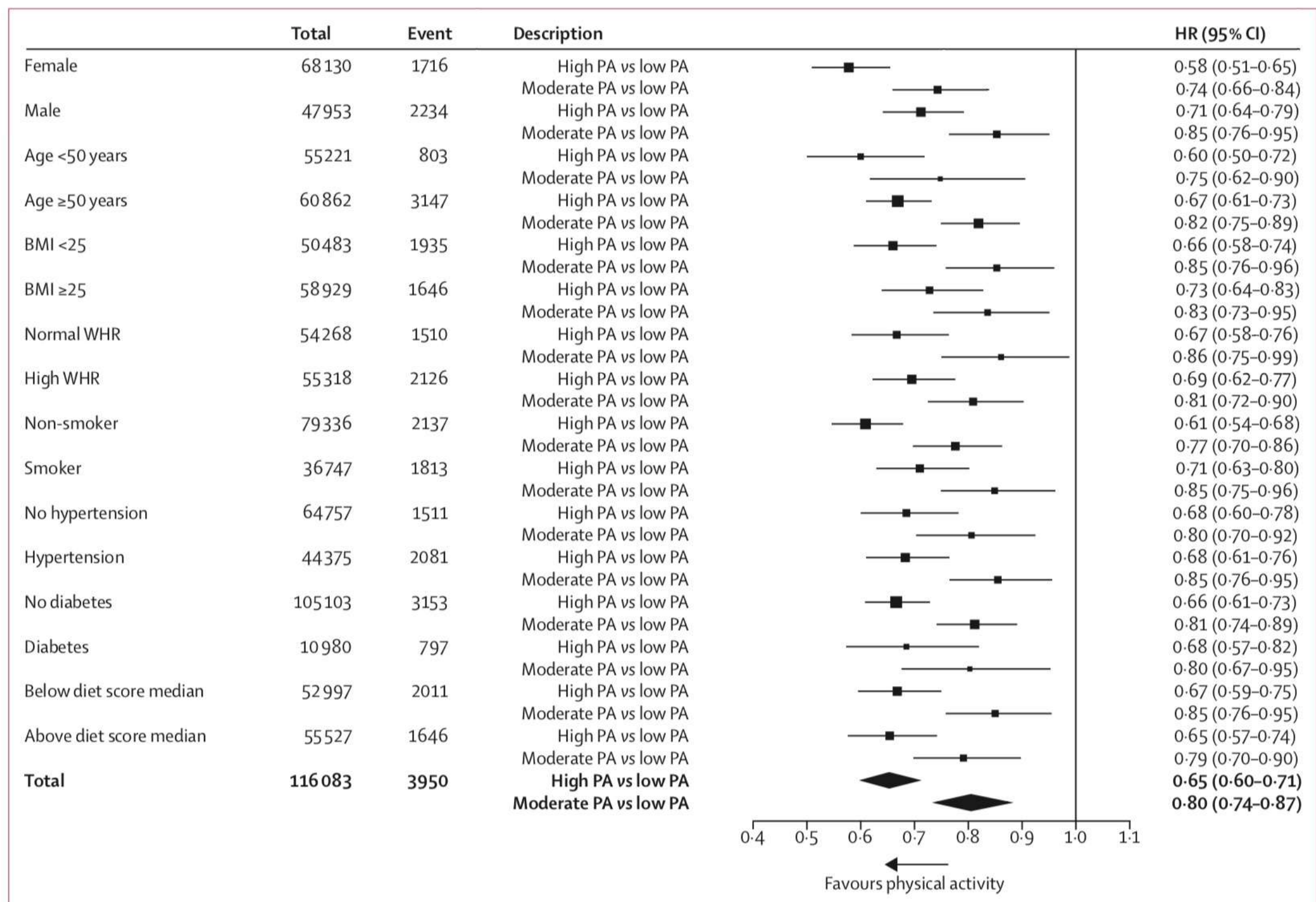


**Figure 1: Hazard ratios and 95% CI for all-cause mortality and major CVD, all-cause mortality, or major CVD by level of physical activity**

Data adjusted for age, sex, education, country income level, urban or rural residency, family history of CVD, and smoking status; taking into account household, community, and country clustering. There were 3155 events for all-cause mortality and major CVD, 2041 events for all-cause mortality, and 1723 events for major CVD. The p values of the first column show the significance of each comparison. p values of the second column show the significance of the overall effect of physical activity. Low physical activity= $\leq 600$  MET  $\times$  min per week. Moderate physical activity= $600\text{--}3000$  MET  $\times$  min per week. High physical activity= $\geq 3000$  MET  $\times$  min per week.

CVD=cardiovascular disease. Major CVD=CVD mortality plus incident myocardial infarction, stroke, or heart failure.

MET=metabolic equivalents.



**Figure 2: Hazard ratios and 95% CI of total physical activity for mortality**

Adjusted for age, sex, education, country income level, urban or rural residency, family history of cardiovascular disease, and smoking status taking into account household, community, and country clustering. Based on data for 115 436 participants with complete data. Low physical activity (<600 MET × min per week) is the reference group. Moderate physical activity=600–3000 MET × min per week. High physical activity=≥3000 MET × min per week. PA=physical activity. HR=hazard ratio. MET=metabolic equivalents. BMI=body-mass index. WHR=waist-to-hip ratio (high WHR was defined as above 0.85 for women and girls and above 0.9 for men and boys).



# Potential Adverse Cardiovascular Effects From Excessive Endurance Exercise.

MayoClinProc.2012;87(6):587-595

James H. O'Keefe, MD; Harshal R. Patil, MD; Carl J. Lavie, MD; Anthony Magalski, MD; Robert A. Vogel, MD; and Peter A. McCullough, MD, MPH

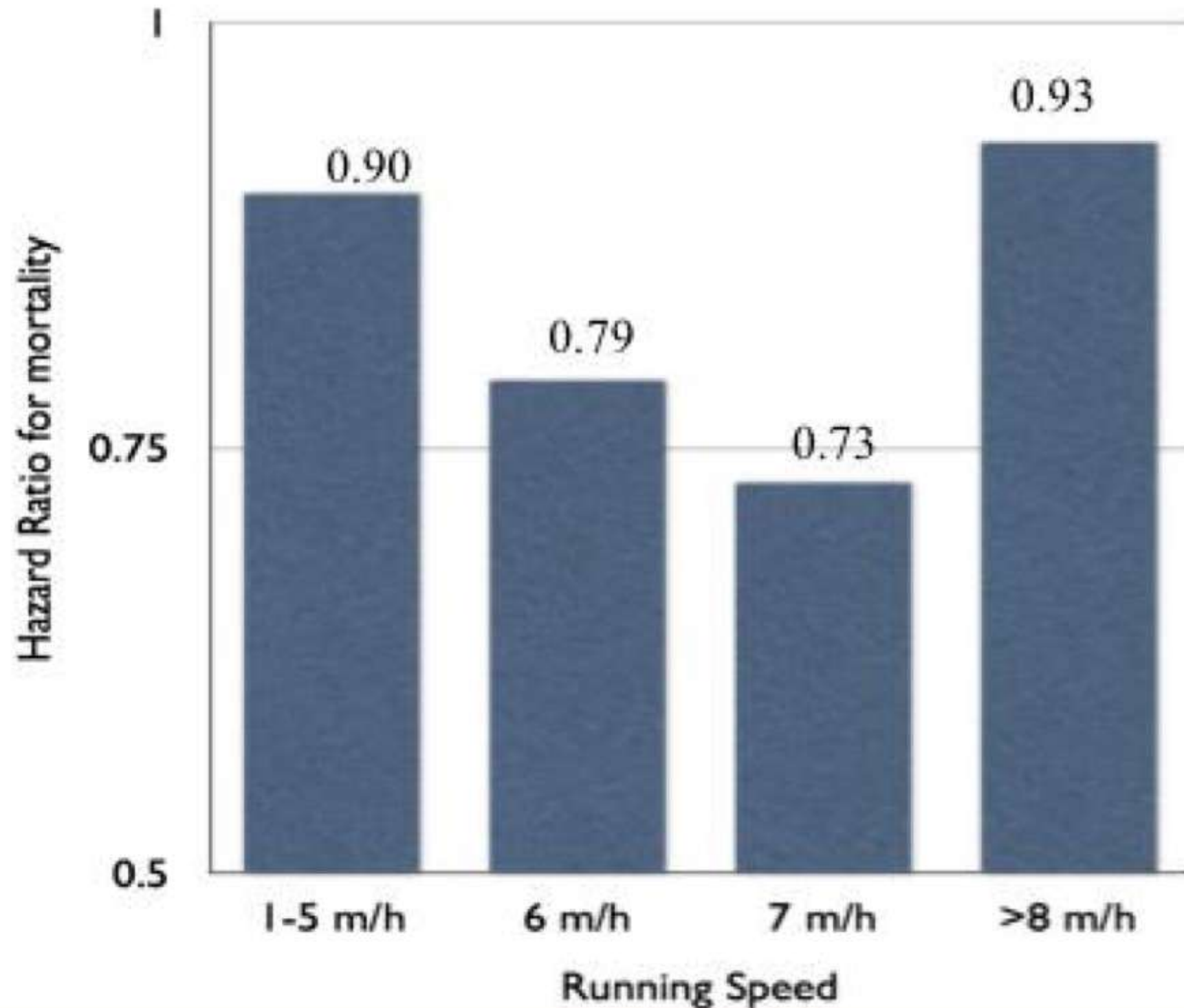
- People who exercise regularly have markedly lower rates of disability and a mean life expectancy that is 7 years longer than that of their physically inactive contemporaries. However, a safe upper-dose limit potentially exists, beyond which the adverse effects of exercise may outweigh its benefits.
- Chronic intense and sustained exercise can cause patchy myocardial fibrosis, particularly in the atria, interventricular septum, and right ventricle, creating a substrate for atrial and ventricular arrhythmias.
- Chronic excessive sustained exercise may also be associated with coronary artery calcification, diastolic dysfunction, and large-artery wall stiffening.
- Veteran endurance athletes in sports such as marathon or ultramarathon running or professional cycling have been noted to have a 5-fold increase in the prevalence of atrial fibrillation.
- Intense endurance exercise efforts often cause elevation in biomarkers of myocardial injury (troponin and B-type natriuretic peptide), which were correlated with transient reductions in right ventricular ejection fraction.



**Figure 2**

Relationship between running speed and mortality.<sup>10</sup>

### U-Shaped Curve: Mortality and Running Speed



# Use It or Lose It

- Sedentary people lose large amounts of muscle mass (20-40%)
- 6% per decade loss of Lean Body Mass (LBM)
- Aerobic activity not sufficient to stop this loss
- Only resistance training can overcome this loss of mass and strength
- Balance and flexibility training contributes to exercise capacity





# Take Aways

- Eat Wisely.      -Plant Slant
- -80% Rule
- Move Naturally
- Right Outlook - Downshift , Purpose
- Connect.              -Loved Ones First, Belong
- Right Tribe



## **Foods to Emphasize for Healing**

For individuals with a diagnosis of atherosclerotic heart disease, peripheral vascular disease, cancer or chronic inflammatory illnesses, a plant-based diet is recommended. The following suggestions can help in maintaining or regaining health.

**Enjoy Fresh Raw or Steamed Vegetables:** The more colorful are best, especially leaves, sprouts, shoots, stalks and stems, flowers and seeds. Lightly steamed or fresh raw vegetables are preferred, but frozen is okay if they have not been processed with additives; do not add sugars, salt, cheese, preservatives or sauces.

**Enjoy Whole Fresh Fruits:** No juices. The more colorful the fruit the better, including all berries, apples, pears, melons, citrus oranges, grapefruits, kiwi and similar mildly sweet fruits. Minimize very sweet fruits like grapes, pineapple, figs, etc. Wash the fruit well and eat the entire fruit if possible, including the skin and usually the seeds. Fruit skins and seeds are packed with vital vitamins, phyto-nutrients and powerful antioxidants that are not common inside the sweeter flesh.

**Enjoy Beans, Peas and Legumes:** These high protein and high fiber foods are satisfying and healthy. This group includes most beans and legumes; lentils, pinto and kidney beans, Garbanzo or chickpeas, green peas, green beans, Chinese pea pods, sweet English peas, black-eyed peas lima beans and navy beans.

**Enjoy Grains:** Rice, oats, rye, wheat, corn, barley, triticale, sorghum and millet are true cereals with are grasses. Amaranth, quinoa and buckwheat are pseudo-cereals with are broad-leaf plants or non-grasses.

**Nuts and Seeds, Sparingly:** Flax seeds, hemp seeds, sesame seeds, almonds, walnuts, pecans, pine nuts, hazelnuts, brazil-nuts and peanuts, most fresh or dried nuts and seeds, without salt or added oils. If roasting, bake at lower temperatures for shorter periods. Nuts and seeds and nut butters are high fat and should be consumed in small amounts.

**Fresh Wild Fish, Sparingly:** Includes wild Alaskan salmon, mackerel, herring, cod, trout, catfish and sardines; choose fresh or frozen, not canned and never farm-raised. Buy fish that have been tested to have low levels of mercury and other pollutants, if possible. No more than 2-3 oz. a week.

**Lean, Non-Grain Fed Meats, Sparingly:** Wild or free range turkey, chicken, pheasant, quail, Cornish hens, bison or buffalo, elk, venison, grass-fed beef and lamb. Serve skinless and well-trimmed of fat. No more than 2-3 oz. a week.

**Enjoy Herbs and Spices, Low Salt:** Ginger, cinnamon, turmeric, clove, anise, basil, oregano, rosemary, black and white peppers, nutmeg, paprika, red pepper, chile pepper, garlic, onion flakes. The list seems endless, but in general the more colorful, and the hotter or spicier the flavors, the better they are for your health. Many spices like turmeric, ginger, cinnamon and oregano have proven to be medicinal in their effects and are often prescribed by natural physicians..

**Enjoy Green and Brown Teas, and Many Herbal Drinks:** Green tea should be taken several times a day by most people since its health benefits seem endless. Brown tea appears safe and reasonably helpful for many people, as do many herbal drinks such as chamomile, spices like ginger, or herbal stimulants such as ginseng. Use the caffeine-free types if possible, especially if you have heart disease or high blood pressure.

### **Remember:**

**Eat 4 servings of fruits per day**  
**Eat 5 servings of vegetables per day**



## Foods to Avoid to Reduce Inflammation and Insulin Resistance

**Avoid All Dairy Products:** Milk, cheese, yogurt, milk powders and other products containing cream, butter, buttermilk, including cottage cheese and low or non-fat milk products. Try almond milk, it is surprisingly similar to the taste of cow's milk without the saturated fat and cholesterol.

**Avoid Fatty, Grain-Fed Meats or Farm-Raised Fish:** All choice or prime cuts of meat, and any grain-fed farm animals, including most beef, pork, lamb, duck, goose, sausages, hamburger, hot dogs, farm-raised salmon, tilapia, trout, catfish, perch, etc. Wild fish are okay, but may contain high levels of mercury and other pollutants.

**Avoid Most Cooking and Salad Oils:** Butter, all vegetable shortening, all margarine, all corn oils, safflower, peanut, canola and other vegetable cooking and salad oils. One quarter cup of apple sauce can be a substitute of one quarter cup of oil. Bananas can be used for oil in baking recipes.

**Avoid All Fried Foods and Foods Cooked at High Temperatures:** Hamburgers, chicken, shrimp, french fries, onion rings; anything deep or pan fried, barbecued, charbroiled or grilled.

**Avoid Eggs:** This includes fresh and powdered eggs. Powdered eggs are especially damaging as the cholesterol in them has been oxidized. Avoid pancake mixes, bisquick and other products that contain powdered eggs.

**Avoid High Fructose Corn Syrup:** Includes most soft drinks and sodas, candies and snacks sweetened with High Fructose Corn Syrup, including many health food meal replacement bars and so-called diet drinks.

**Avoid Sugars and Sweets:** Avoid all artificial sweeteners and foods with them, containing aspartame, saccharin or sucralose. Try substituting Agave Nectar Syrup or Stevia liquid or powders.

**Avoid Refined/Processed Carbohydrates:** Pastries, pies, cakes, cookies, crackers and dip-chips, etc. These typically are white flour products with a high amount of added fat and sugar.

**Avoid Addictive Foods and Products:** No tobacco products including cigarettes, cigars, pipes, snuff, or chewing tobacco. No alcohol drinks and products, including beer, wine and whiskey or liqueurs. No other recreational drugs, legal or not.



1650 Cowles Street, Fairbanks, AK 99701

[communityfeedback@foundationhealth.org](mailto:communityfeedback@foundationhealth.org)

*Romel Wrenn M.D., FACC, Cardiologist, Porter Heart Center at Fairbanks Memorial Hospital  
Adrienne Lee RD, LD, Registered Dietitian, Fairbanks Memorial Hospital*



# Meditation and Cardiovascular Risk Reduction

## A Scientific Statement From the American Heart Association

Journal of the American Heart Association. 2017;6:e002218

Originally published September 28, 2017

Glenn N. Levine, MD, FAHA, Chair; Richard A. Lange, MD, MBA, FAHA, Vice Chair; C. Noel Bairey-Merz, MD, FAHA; Richard J. Davidson, PhD; Kenneth Jamerson, MD, FAHA; Puja K. Mehta, MD, FAHA; Erin D. Michos, MD, MHS, FAHA; Keith Norris, MD; Indranill Basu Ray, MD; Karen L. Saban, PhD, RN, APRN, CNRN, FAHA; Tina Shah, MD; Richard Stein, MD; Sidney C. Smith, Jr, MD, FAHA; on behalf of the American Heart Association Council on Clinical Cardiology; Council on Cardiovascular and Stroke Nursing; and Council on Hypertension

# Meditation

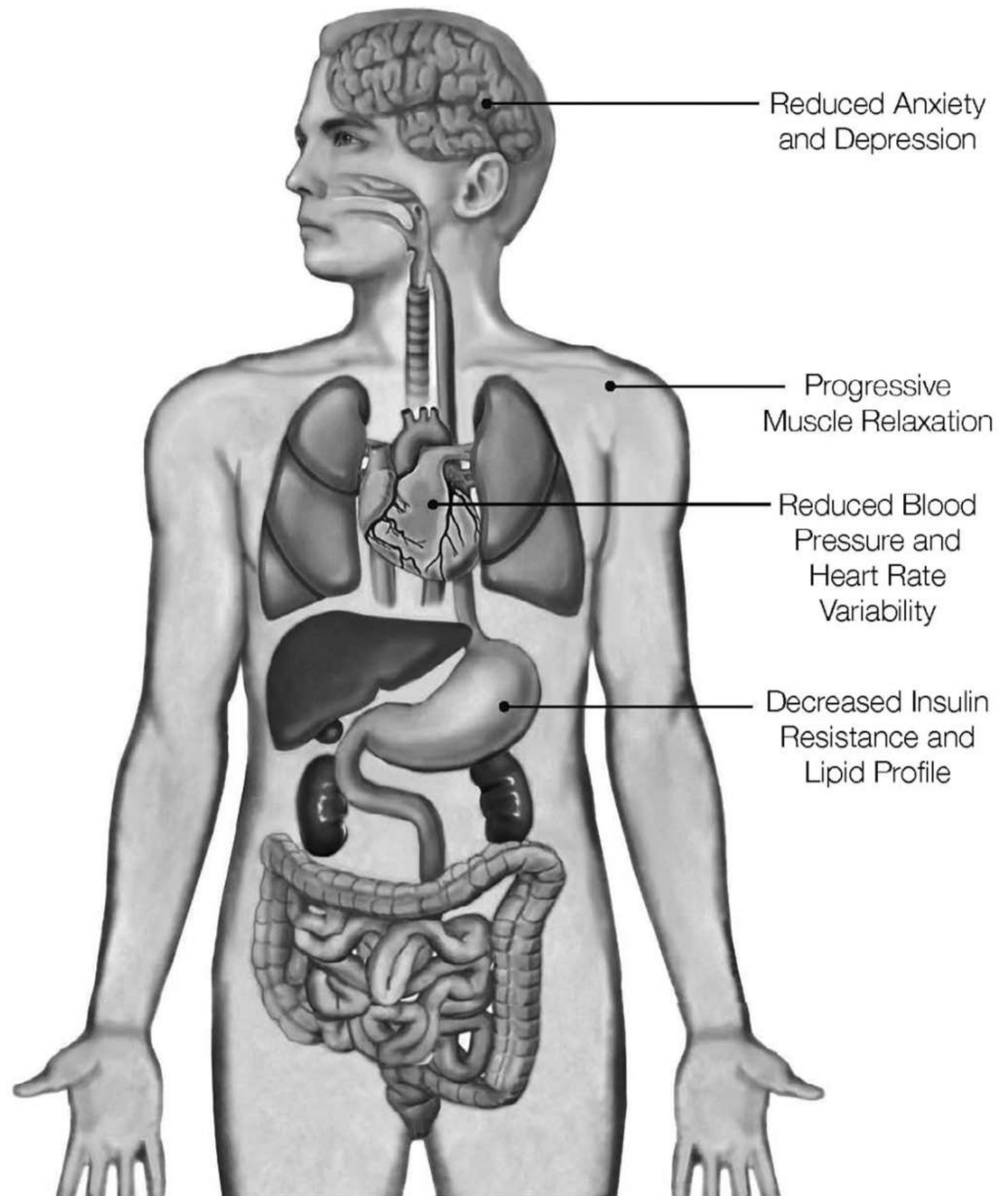


Figure. The effects of meditation on the body.



**Table 1.** Common Types of Meditation

Meditation	Description	Origins and Well-Known Teachers in the West
Samatha meditation	Samatha is translated to mean “calm” and samatha meditation is often referred to as calm, abiding meditation. Samatha meditation is the practice of calming the mind by practicing single-pointed meditation through mindful concentration focusing on the breath, image, or object.	Buddhist practice, dating to the time of the Buddha or even before
Vipassana meditation (insight meditation)	Vipassana is translated to mean, “to see things as they really are.” Vipassana emphasizes awareness of the breath, tuning into the air passing in and out through the nose. Vipassana teaches one to label thoughts and experiences as they arise, taking mental notes as one identifies objects that grab one’s attention. Vipassana meditation is often taught at 10-day retreats.	Traditional Buddhist and Indian meditation. Well-known teachers include Mahasi Sayadaw, S.N. Goenka, Sharon Salzberg, Joseph Goldstein, Jack Kornfield, and Michael Stone
Mindful meditation	An umbrella term for the category of techniques used to create awareness and insight by practicing focused attention, observing, and accepting all that arises without judgment. This type of meditation is also referred to as “open monitoring,” in which one allows one’s attention to flow freely without judgment or attachment.	Origins come from Buddhist teaching. Well-known Western teachers include Jon-Kabat Zinn, Tara Brach, Sharon Salzberg, Joseph Goldstein, Jack Kornfield, and Pema Chodron
Zen meditation (zazen)	A type of meditation where one focuses one’s awareness on one’s breath and observes thoughts and experiences as they pass through the mind and environment. In some senses similar to Vipassana meditation, but with an emphasis on a focus of the breath at the level of the belly and on posture while sitting.	Buddhist meditation from Japan. Well-known teachers include Thich Nhat Hanh and Joan Halifax Roshi
Raja yoga meditation	Referred to also as “mental yoga,” “yoga of the mind,” or Kriya yoga. A practice of concentration to calm the mind and bring it to one point of focus. Includes a combination of mantra, breathing techniques, and meditation on the chakras/spinal cord focus points.	Hindu practice dating back thousands of years. Introduced to the West in 1893 by Swami Vivekananda. Further clarified and taught by Paramhansa Yogananda for the Western audience
Loving-kindness (metta) meditation	Loving-kindness meditation involves sending loving kindness to oneself, then continuing to send it to a friend or loved one, to someone who is neutral in your life, to a difficult person, and then out to the universe. Through this practice, the meditator cultivates a feeling of benevolence toward oneself and others.	Originates from Buddhist teachings, mainly Tibetan Buddhism. Well-known instructors include Sharon Salzberg and Pema Chodron
Transcendental meditation	Mantra-based meditation technique in which each practitioner is given a personal mantra that is used to help settle the mind inward. Transcendental meditation is taught by certified teachers through a standard 4-day course of instruction. Transcendental meditation is practiced for 20 minutes twice daily.	Origins in ancient Vedic traditions of India. Popularized in the West by the Maharishi Mahesh Yogi and now taught in the United States by the Maharishi Foundation
Relaxation response	A multifaceted practice that can involve awareness and tracking of breaths or repetition of a word, short phrase, or prayer	A term and practice pioneered by Dr Herbert Benson in the 1970s, based in part of the practice of transcendental meditation

There is no definitive definition of most types of meditation. These descriptions represent a synthesis of numerous sources and are best viewed as a general overview of the techniques.

Initial table concept from references 20 and 21. Additional data from references 16–19 and 22–28.

Table adapted with permission from Rakel,<sup>21</sup> *Integrative Medicine*, 3rd ed. Copyright Elsevier 2012.



**Table 2.** Summary of Findings on Studies of Meditations and Cardiovascular Risk Reduction\*

Topic	Findings
Neurophysiology and neuroanatomy	<ul style="list-style-type: none"> <li>• Neurophysiological and neuroanatomical studies suggest that meditation can have long-standing effects on brain physiology and anatomy</li> <li>• Studies generally are nonrandomized and involve modest numbers of participants, sometimes performed under the direction of extremely experienced (&gt;10 000 hours) meditators</li> <li>• Different forms of meditation have different psychological and neurological effects, and thus the neurophysiological and neuroanatomic findings of 1 type of meditation cannot be extrapolated to other forms of meditation</li> </ul>
Psychological, psychosocial, and physiological response to stress	<ul style="list-style-type: none"> <li>• Many, although not all, studies report that meditation is associated with improved psychological and psychosocial indices</li> <li>• Differences in populations, control of potential confounders, and type and length of meditation evaluated may account for discrepant findings. Small sample sizes and lack of randomization are common study limitations</li> <li>• Further study is needed on how meditation influences physiological processes associated with the stress response</li> </ul>
Blood pressure	<ul style="list-style-type: none"> <li>• Magnitude of reductions of systolic blood pressure varies widely</li> <li>• Study limitations including the methods of blood pressure measurements and bias in data ascertainment, high dropout rates, and different populations studied</li> </ul>
Smoking and tobacco use	<ul style="list-style-type: none"> <li>• Some randomized data show that mindful meditation instruction improves smoking cessation rates</li> </ul>
Insulin resistance and metabolic syndrome	<ul style="list-style-type: none"> <li>• Limited data on the effects of meditation on insulin resistance and metabolic syndrome</li> </ul>
Subclinical atherosclerosis	<ul style="list-style-type: none"> <li>• A few suboptimal studies of meditation and lifestyle intervention suggest the potential for benefit on atherosclerosis regression</li> <li>• Studies limited by multimodality approach, attrition, and incomplete follow-up</li> <li>• No firm conclusions can be drawn on the effects of meditation on atherosclerosis</li> </ul>
Endothelial function	<ul style="list-style-type: none"> <li>• Three studies showed no benefit of meditation on brachial reactivity in the overall cohorts, although 1 study suggested a benefit in a subgroup of patients with coronary artery disease</li> <li>• No conclusions can be drawn on the effects of meditation on endothelial function</li> </ul>
Inducible myocardial ischemia	<ul style="list-style-type: none"> <li>• Limited older studies suggest that meditation can lead to improvement in exercise duration and decreased myocardial ischemia</li> <li>• No contemporary studies have evaluated effects of meditation on myocardial blood flow or ischemia with advanced imaging techniques</li> </ul>
Primary prevention of CVD	<ul style="list-style-type: none"> <li>• Two studies of short-term intervention report surprising mortality reductions, and thus these findings need to be reproduced in larger, multicenter studies</li> <li>• Overall, because of the limited evidence to date, no conclusions can be drawn as to the effectiveness of meditation for the primary prevention of CVD</li> </ul>
Secondary prevention of CVD	<ul style="list-style-type: none"> <li>• Data on the potential benefits of meditation in patients with established coronary artery disease can best be characterized as generally of modest quality and as suggesting, but not definitely establishing, benefit</li> <li>• Because of generally limited follow-up time, there are more data on reduction of cardiac risk factors and psychological indices than on hard end points (eg, death, myocardial infarction)</li> </ul>

\*Summaries of the individual studies, as well as their limitations, evaluated in this scientific statement are provided in Tables S1 through S9.  
CVD indicates cardiovascular disease.

### **Table 3.** Summary of Findings and Suggestions on Meditation and Cardiovascular Risk Reduction

- Studies of meditation suggest a *possible* benefit on cardiovascular risk, although the overall quality and, in some cases, quantity of study data is modest
- The mainstay for primary and secondary prevention of CVD is ACC/AHA guideline-directed interventions
- Meditation may be considered as an adjunct to guideline-directed cardiovascular risk reduction by those interested in this lifestyle modification with the understanding that the benefits of such intervention remain to be better established
- Further research on meditation and cardiovascular risk is warranted. Such studies, to the degree possible, should meet the following criteria:
  - Utilize a randomized study design
  - Blinded adjudication of end points
  - Adequate power to meet the primary study outcome(s)
  - Include long-term follow-up
  - Have <20% dropout rate
  - Have >85% follow-up data
  - Be performed by investigators without inherent financial or intellectual bias in outcome



