

Plant-Based Diets

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Building Our Evidence Base

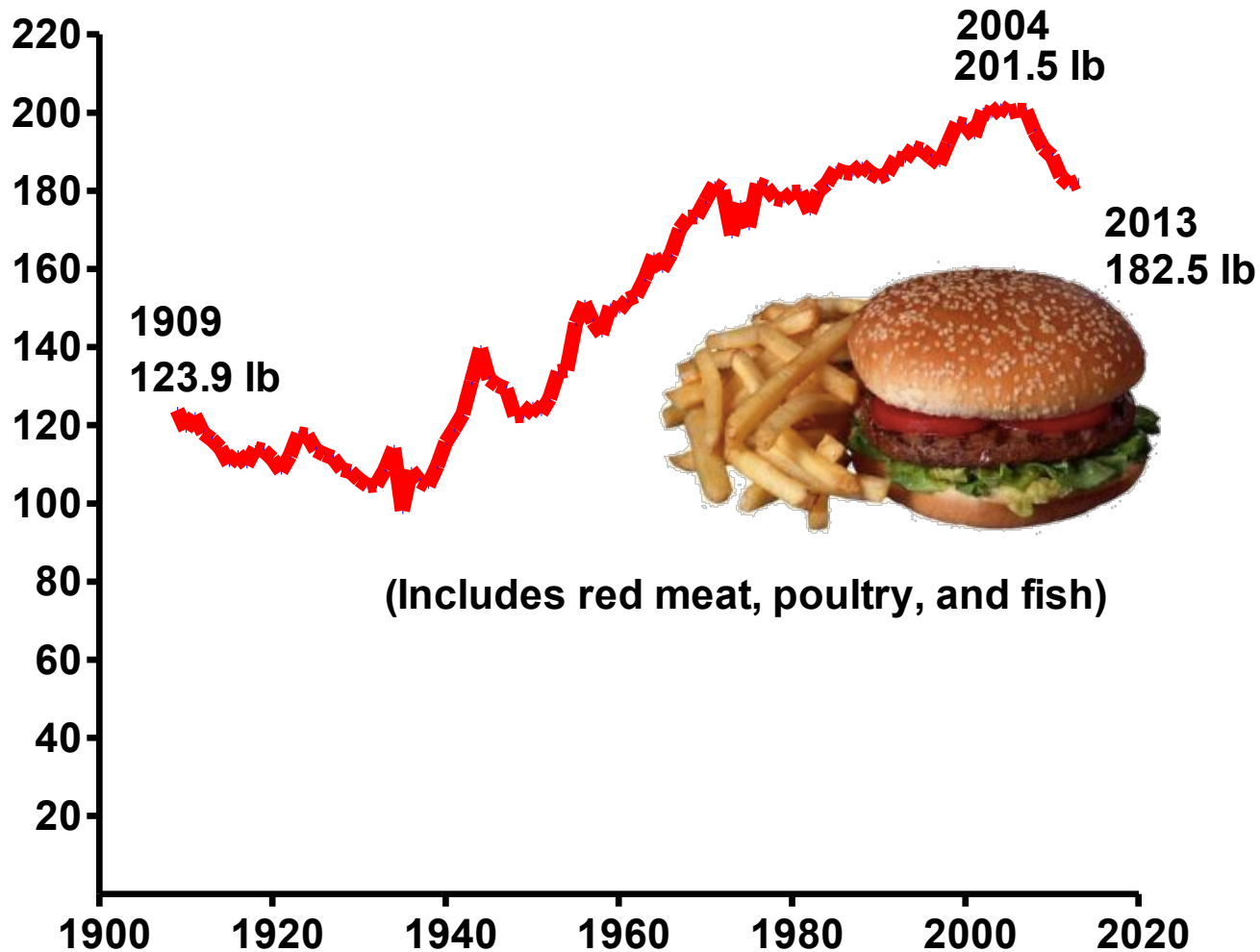


**Systematic
Reviews**

Intervention Trials

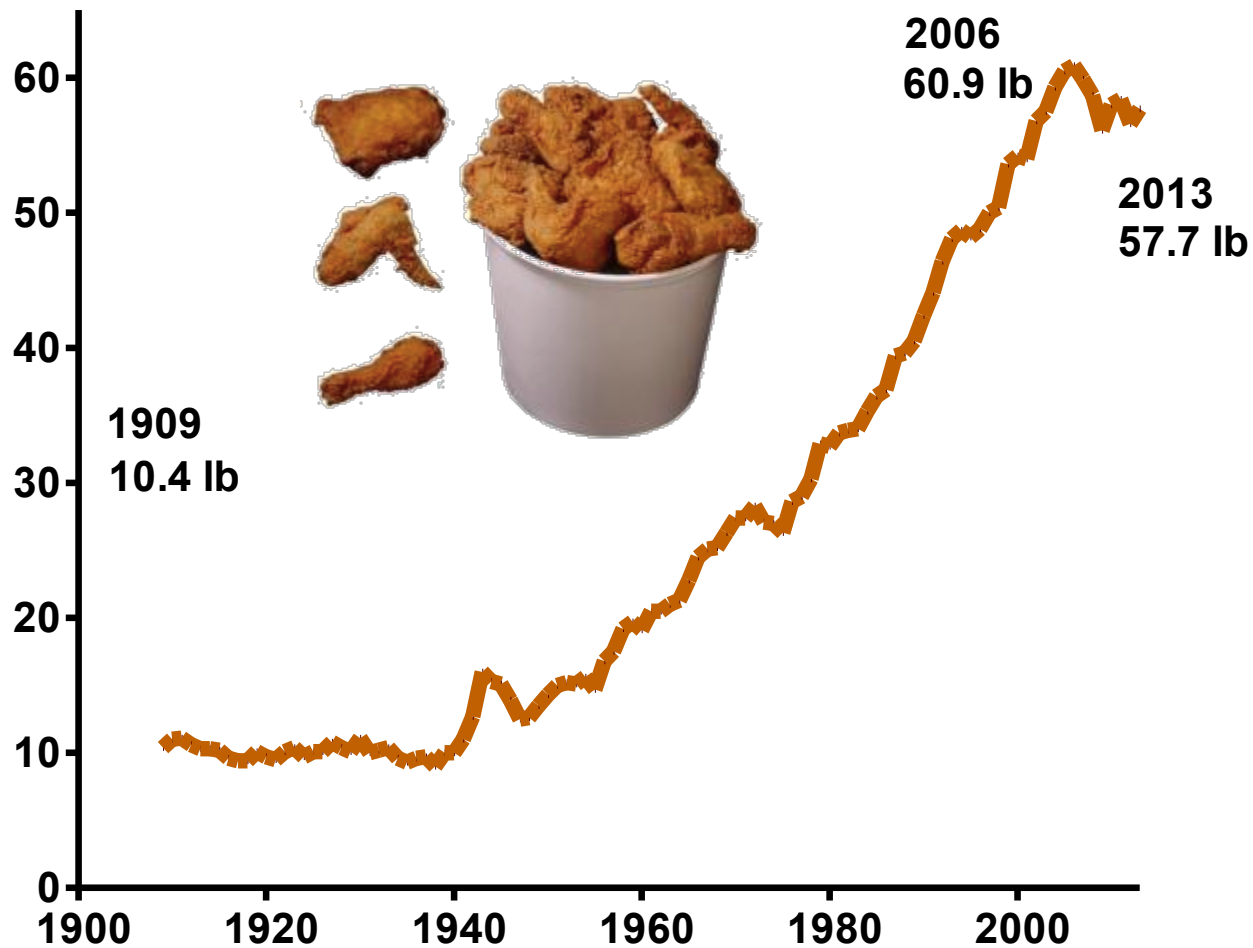
Observational Studies

U.S. Per Capita Meat Intake (lb)



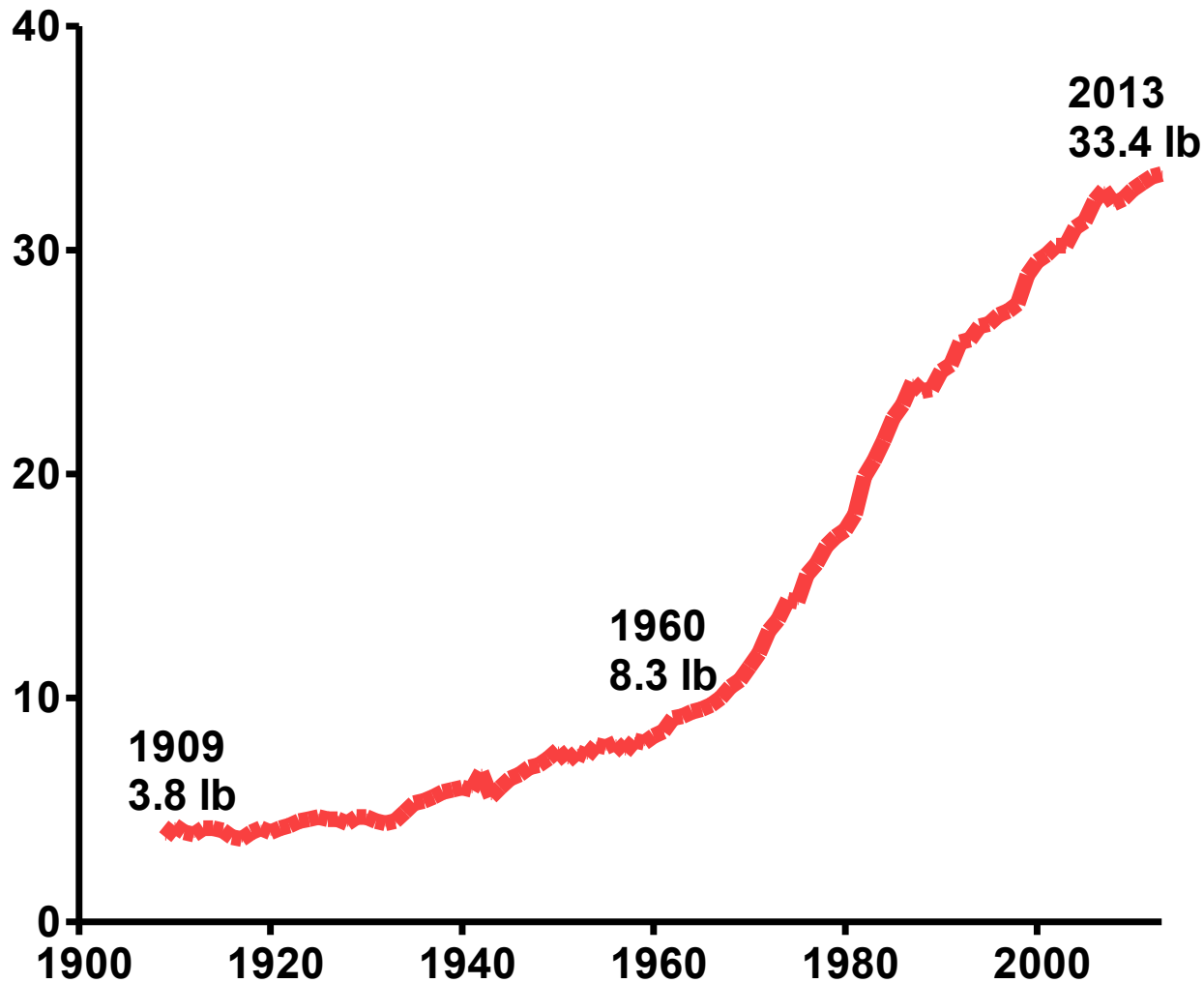
Source: US Department of Agriculture, Economic Research Service,
<http://www.ers.usda.gov/Data/FoodConsumption/FoodAvailSpreadsheets.htm#mtpcc>,
accessed August 15, 2009.

U.S. Per Capita Chicken Intake (lb)



Source: US Department of Agriculture, Economic Research Service,
<http://www.ers.usda.gov/Data/FoodConsumption/FoodAvailSpreadsheets.htm#mtpcc>,
accessed August 15, 2009.

U.S. Per Capita Cheese Consumption (pounds)



Source: US Department of Agriculture, Economic Research Service,
[http://ers.usda.gov/data-products/food-availability-\(per-capita\)-data-system/.aspx#26705](http://ers.usda.gov/data-products/food-availability-(per-capita)-data-system/.aspx#26705), accessed November 14, 2015.

1. What do we know?

2. What do we not know?

3. What would we agree on?

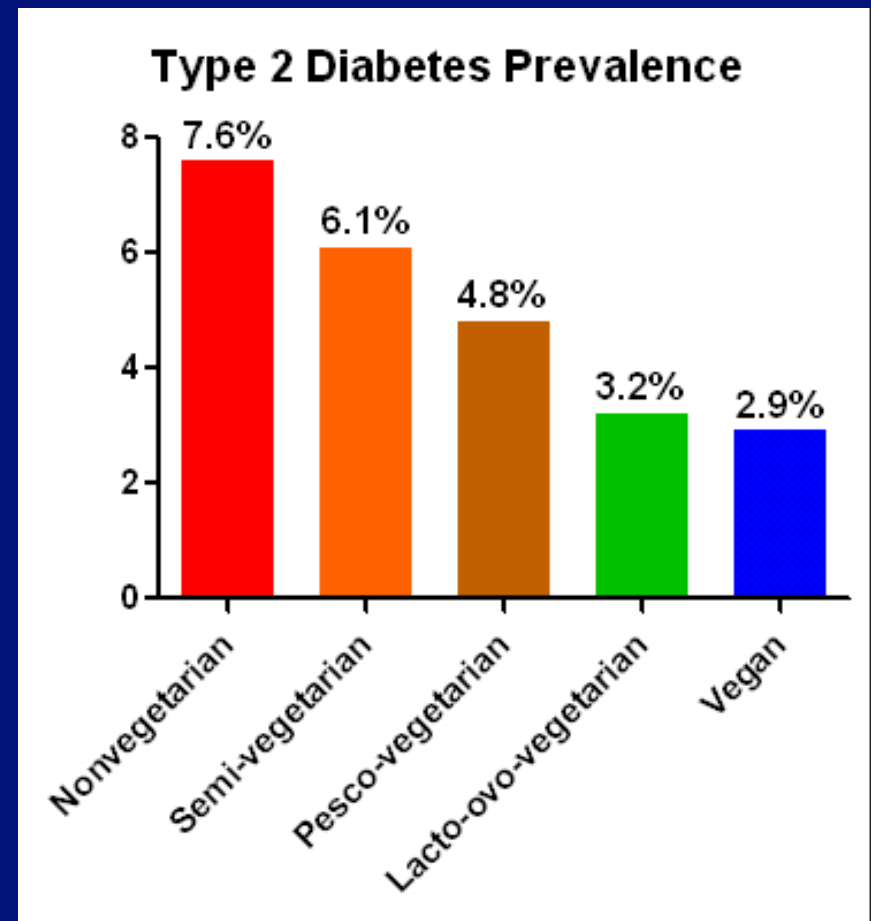
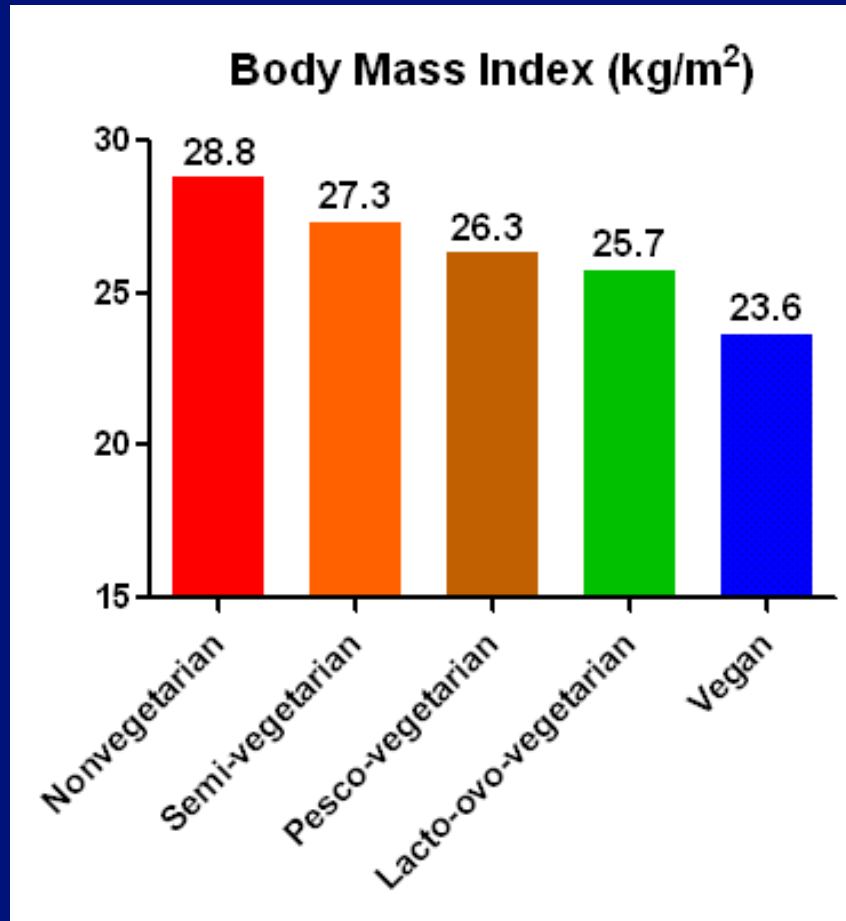
What We Know about Plant-Based Diets

Observational Studies

1. Healthy body weight
2. Low risk of type 2 diabetes
3. Healthy blood pressure
4. Low total and LDL cholesterol
5. Reduced risk of certain cancers

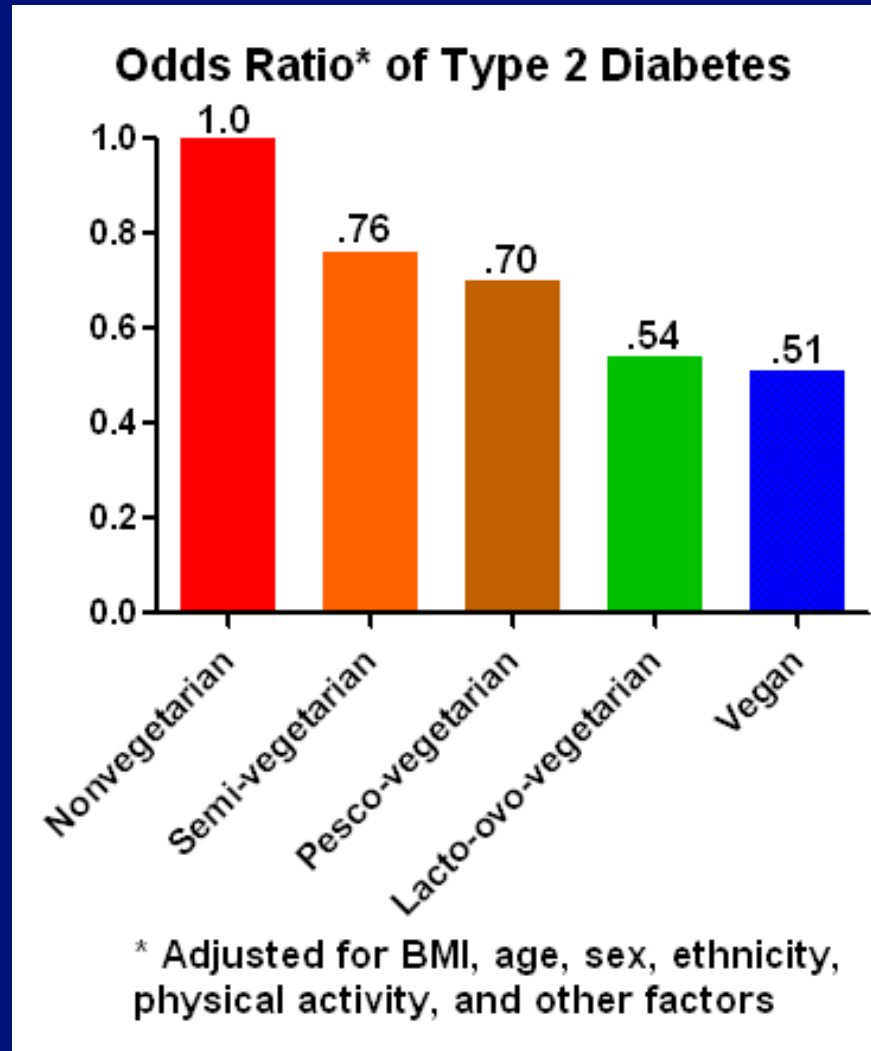
Adventist Health Study – 2

60,903 participants, aged ≥ 30 , enrolled 2002-2006



Tonstad S, et al. Type of vegetarian diet, body weight and prevalence of type 2 diabetes. Diabetes Care 2009;32:791-6.

Adventist Health Study – 2

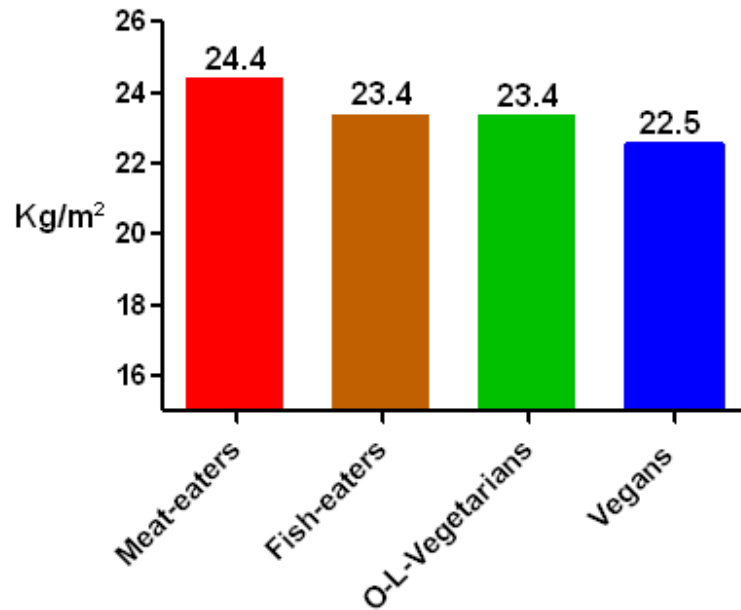


Tonstad S, et al. Type of vegetarian diet, body weight and prevalence of type 2 diabetes. Diabetes Care 2009;32:791-6.

European Prospective Investigation into Cancer and Nutrition (EPIC)

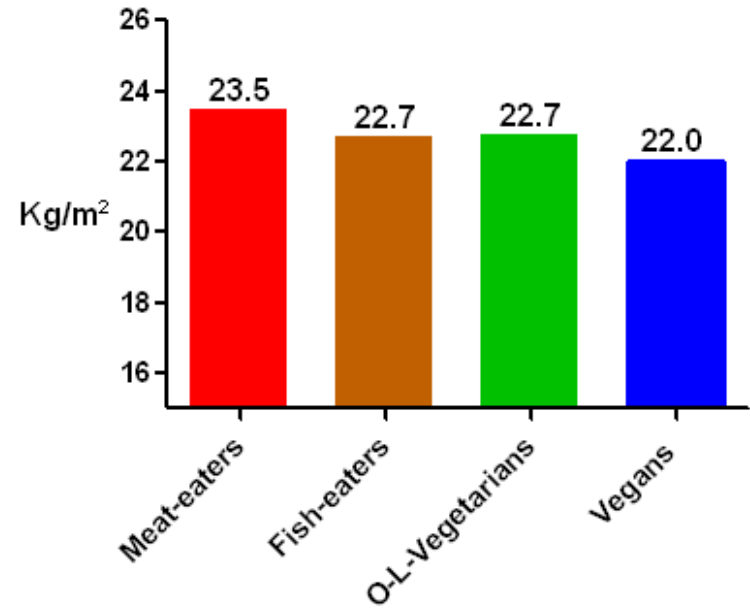
N = 37,875; aged 20 – 97; enrolled 1993 - 1999

Body Mass Index* (men)



*Adjusted for age, smoking, education, physical activity, marital status, ethnicity.

Body Mass Index* (women)

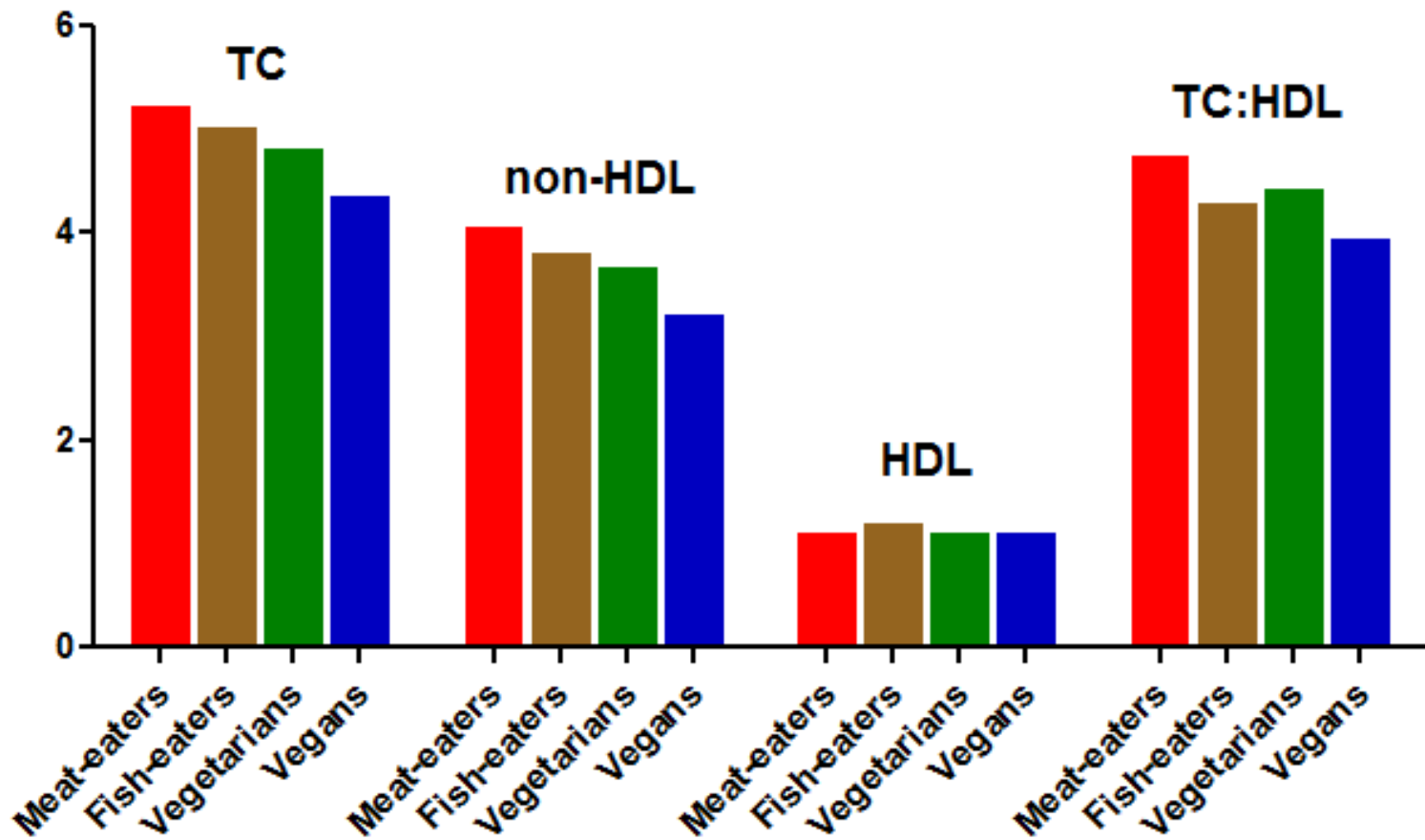


*Adjusted for age, smoking, education, physical activity, marital status, ethnicity, parity.

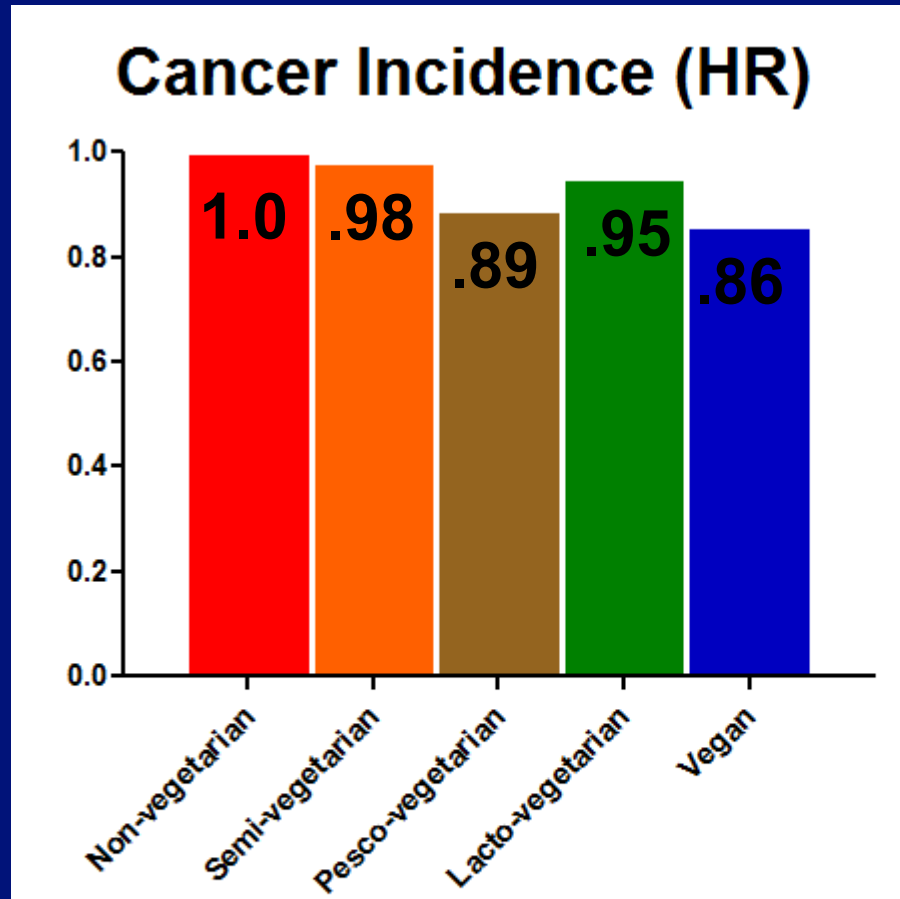
Spencer EA, et al. Diet and body mass index in 38,000 EPIC-Oxford meat-eaters, fish-eaters, vegetarians, and vegans. *Int J Obesity* 2003;27:728-34.

EPIC Oxford

Serum Lipids (mmol/L) in Men



Adventist Health Study-2



Tantamango-Bartley Y. Cancer Epidemiol Biomarkers Prev 2013;22:286-294.

HR adjusted by race, family history of cancer, BMI, education, smoking, alcohol, age at menarche, pregnancies, breastfeeding, oral contraceptives, hormone replacement therapy, and menopause status.

What We Know about Plant-Based Diets

Intervention Trials

Trials are often mixed interventions:

- a. Low-fat
- b. Low-GI

Not necessarily substitution

- a. Energy intake falls

Other interventions: exercise, stress management

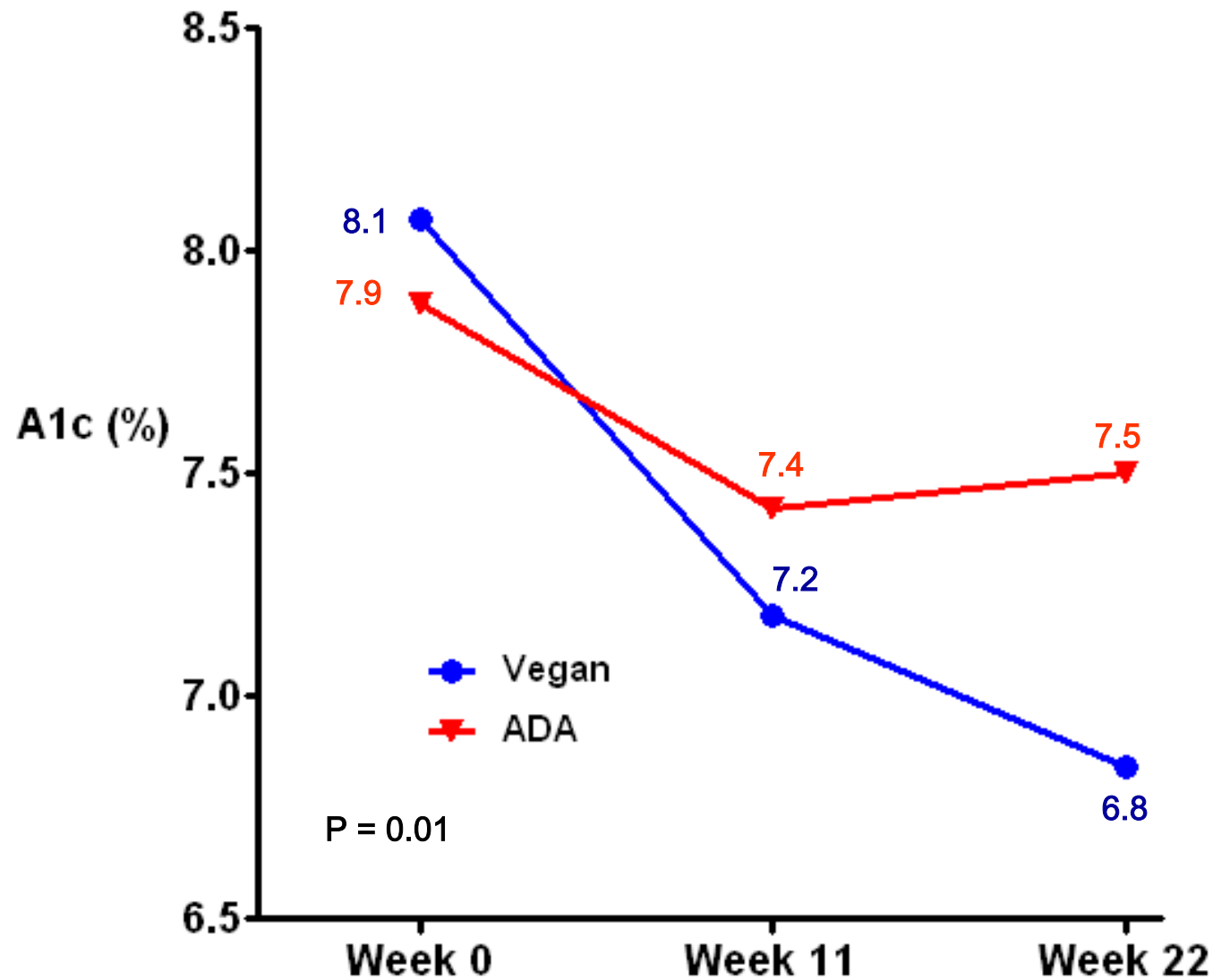
What We Know about Plant-Based Diets

Intervention Trials

1. Improve body weight
2. Reduce BP
3. Reduce total and LDL-cholesterol
4. Improve glycemic control
5. Improve indices of prostate cancer

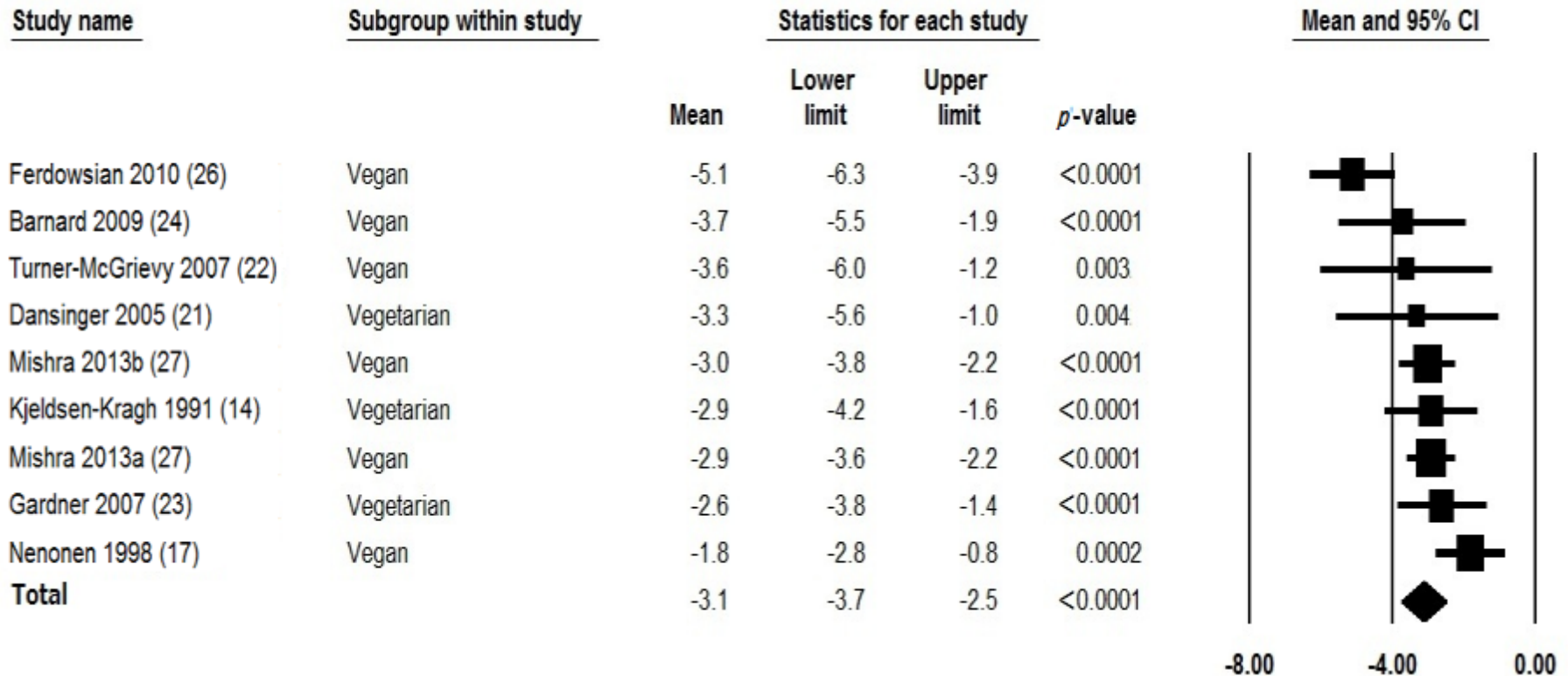
Hemoglobin A1c at Baseline and at 11 and 22 Weeks

Individuals with no medication changes, n = 24 vegan, 33 ADA



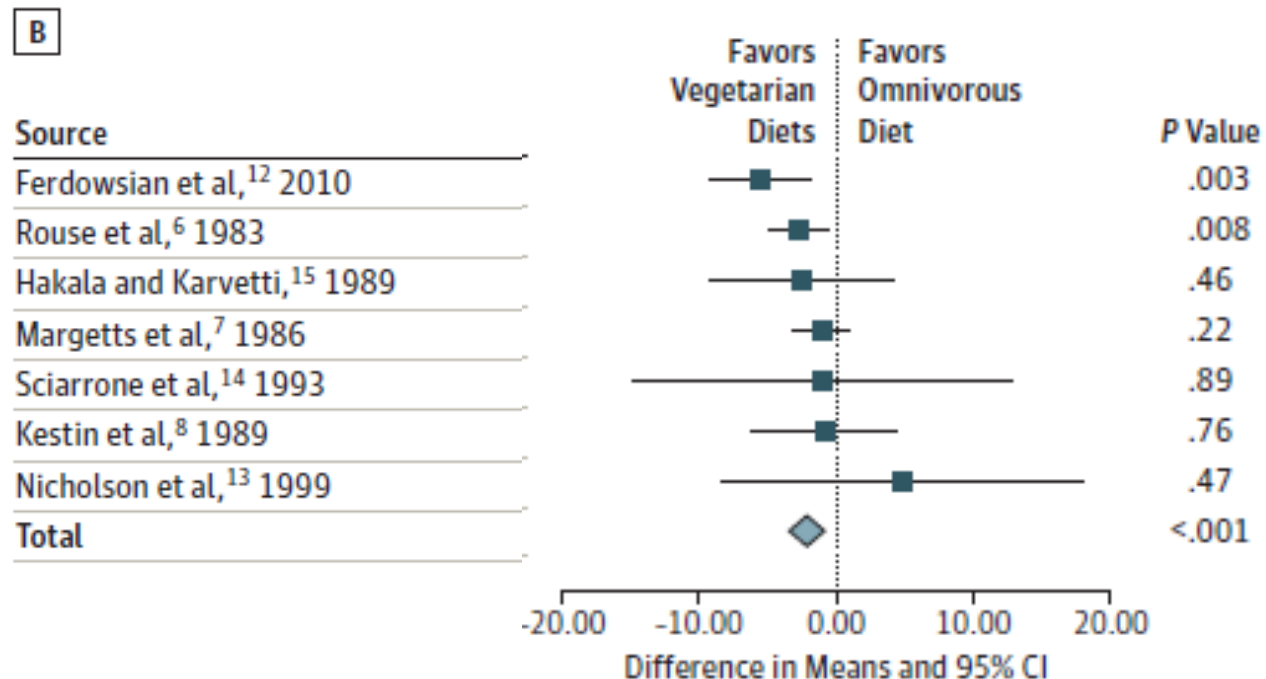
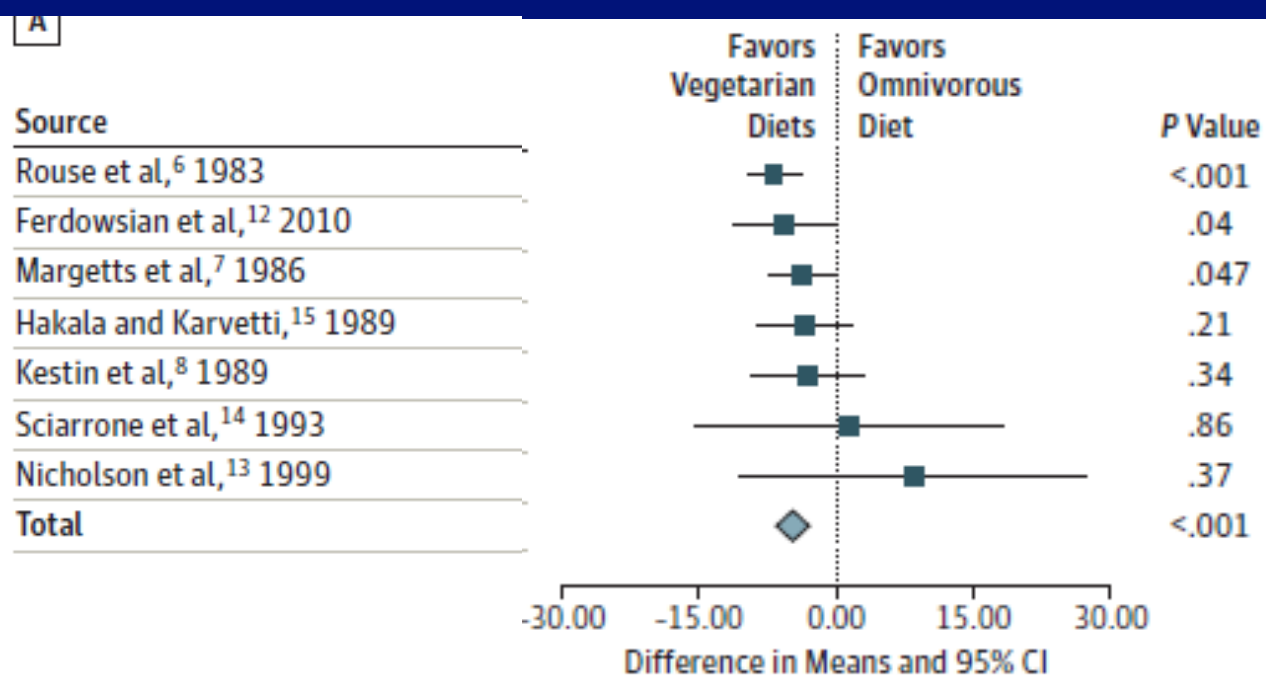
Systematic Reviews and Meta-Analyses

Clinical Trials, Body Weight



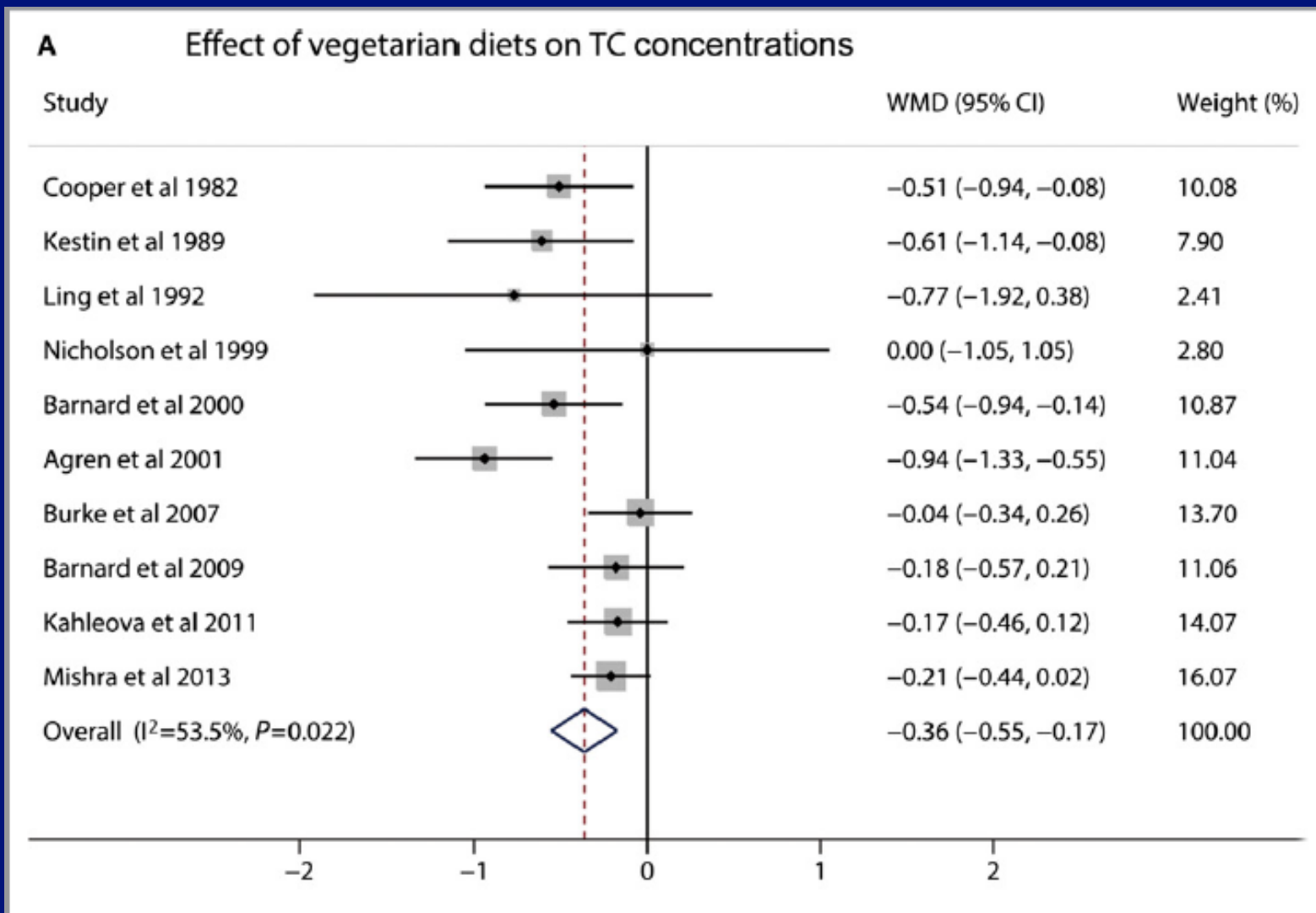
ITT analysis from: Barnard ND, et al. J Acad Nutr Diet. 2015;115(6):954-69.

Clinical trials, systolic & diastolic BP



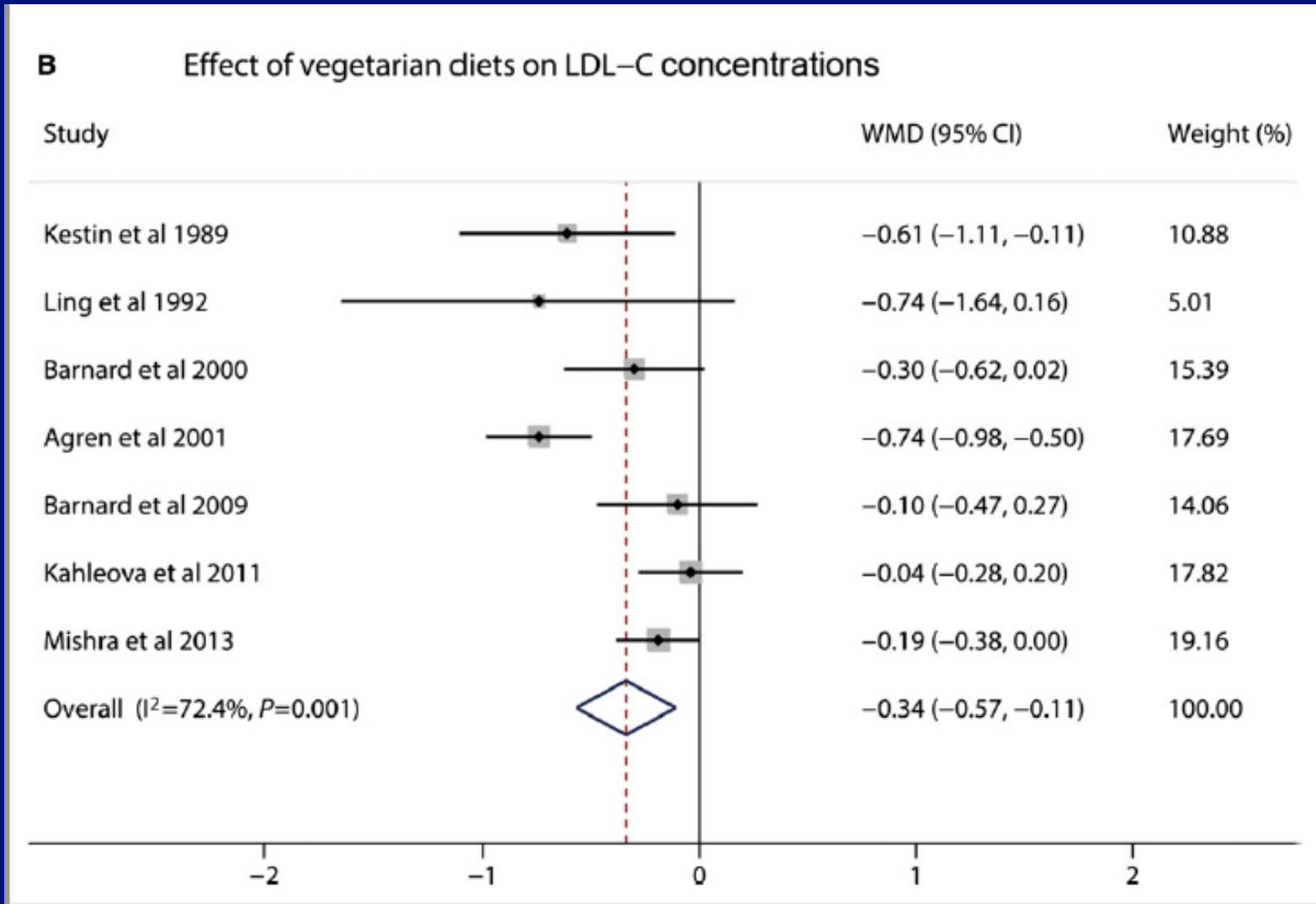
Yokoyama Y, et al.
Vegetarian diets and blood pressure: a meta-analysis.
JAMA Internal Medicine
2014, 2014 Apr;174(4):
577-87.

Clinical Trials, Total Cholesterol



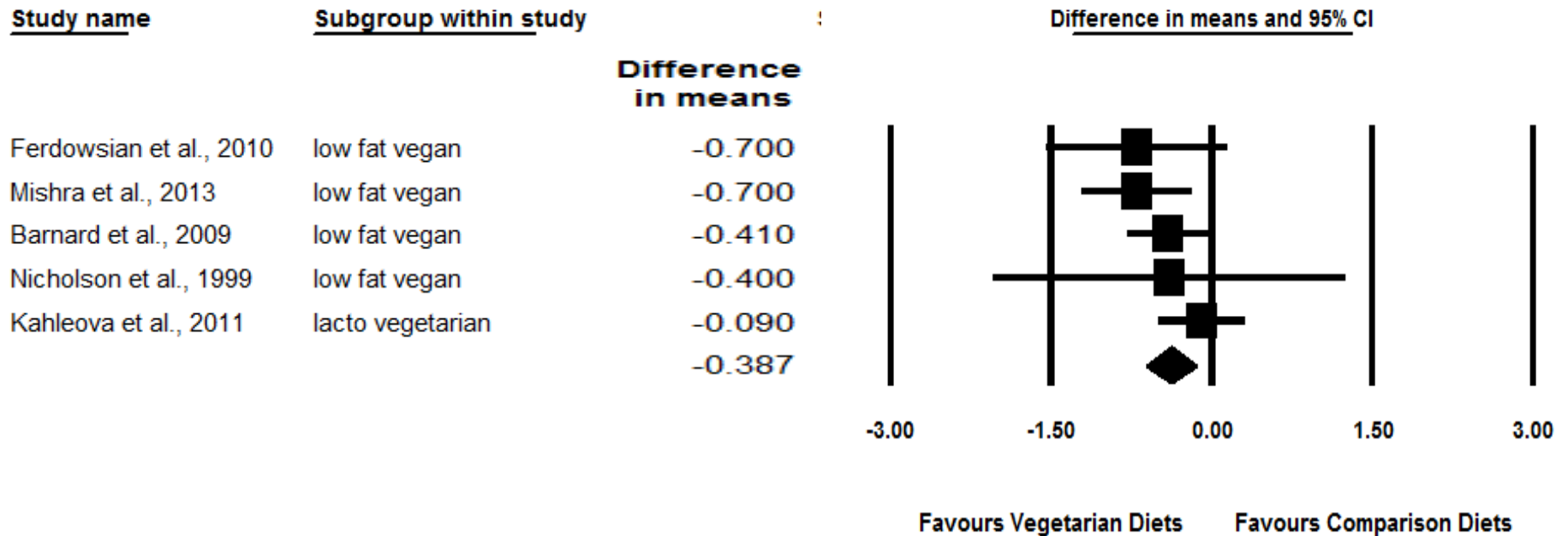
Wang F, et al. Effects of vegetarian diets on blood lipids: a systematic review and meta-analysis of randomized controlled trials. J Am Heart Asso. 2015;4:e002408.

Clinical Trials, LDL



Wang F, et al. Effects of vegetarian diets on blood lipids: a systematic review and meta-analysis of randomized controlled trials. J Am Heart Asso. 2015;4:e002408.

Clinical Trials, HbA1c



Yokoyama et al. Cardiovascular Diagnosis and Therapy. 2014;4(5):373-82.

What We Know: Weight

Veg diets → healthier body weight

a. Without limits on calories or carbohydrate.

b. Trials last > 2 years.

c. Mechanisms:

More fiber, less fat → ↓ energy density

What We Know: Lipids

Veg diets → ↓ Total and LDL

a. Mechanisms:

↓ Saturated fat, ↓ dietary cholesterol

↑ Soluble fiber, soy, nuts

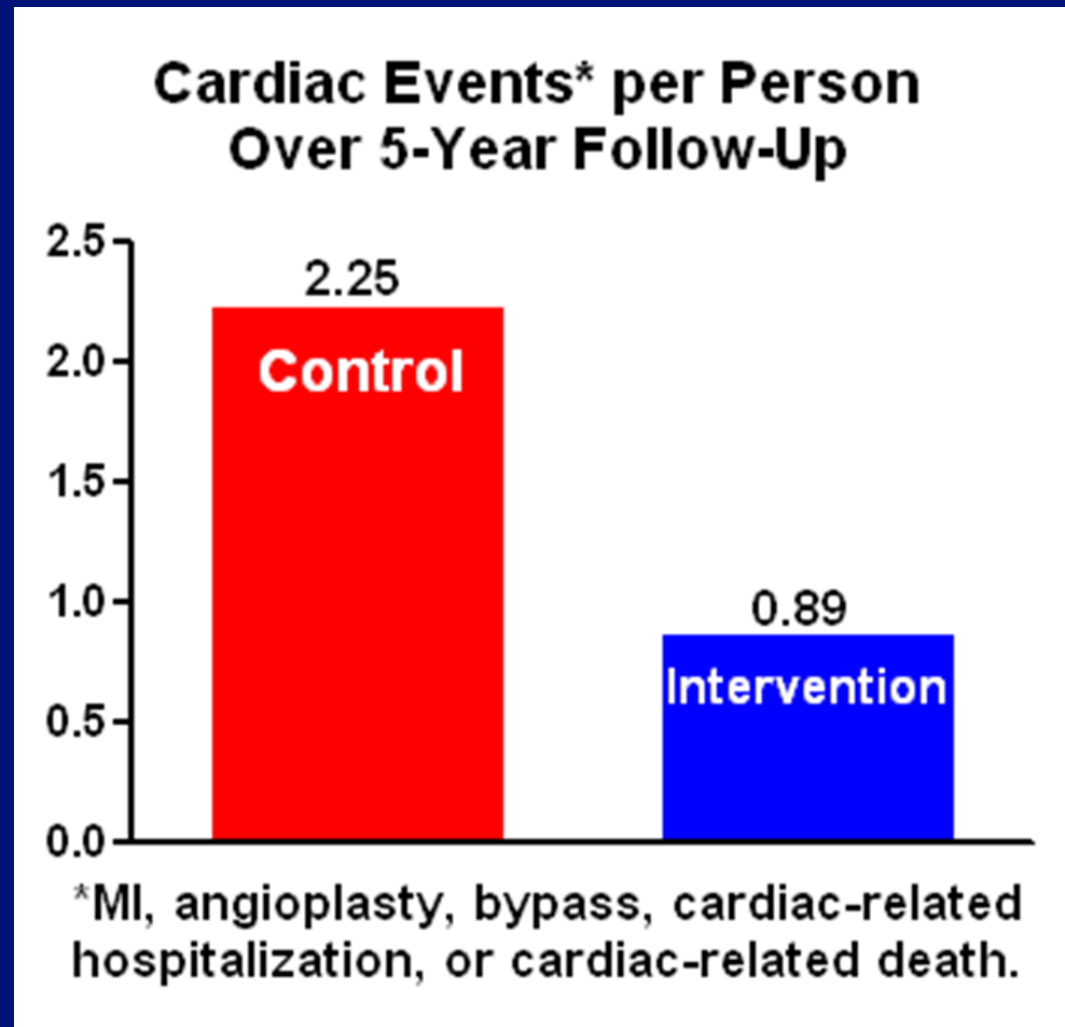
Variable effect on triglycerides

a. Mechanism: effect of Glycemic Index?

Lifestyle Heart Trial

Dean Ornish, M.D.
Preventive Medicine
Research Institute
Sausalito, California

Randomized trial:
lifestyle intervention
vs.
usual care



Ornish D. JAMA 1998;280:2001-7.

What We Know: BP

Veg diets → ↓ Systolic and diastolic BP

a. Short-term mechanisms:

↑ Potassium

↓ Blood viscosity

b. Long-term mechanisms:

↓ Body weight

What We Know: Diabetes Risk

Veg diets: ↓ diabetes prevalence

Presumed mechanisms:

↓ Body weight

Benefit persists after adjustment for weight

↓ Insulin resistance (↓ intracellular lipid)

What We Know: Diabetes Treatment

Vegan diets for type 2 diabetes:

- a. ↓ A1C, weight, lipids, medication use, neuropathy symptoms.
- b. Convincing evidence from randomized trials up to 1.5 years.
- c. Presumed mechanisms:
 - ↓ Body weight
 - ↓ Intracellular lipid

What We Know: Nutrient Adequacy

1. AHEI improves with vegan diets.
2. Reduced fat, cholesterol, sodium.
3. Increased fiber, β -carotene, vitamins C and K, folate, magnesium, potassium.
4. Protein is adequate.
5. Calcium: green leafy vegetables and legumes.
6. Iron is adequate.
7. Vitamin B₁₂ must be supplemented.

What We Know: Acceptability

1. Heart patients
2. Women with dysmenorrhea
3. Postmenopausal overweight women
4. Individuals with type 2 diabetes
5. Individuals at work: GEICO Study
6. Vegan meals and soymilk in children

Barnard ND. J Cardiopulm Rehab 1992;12:423-31.

Barnard ND. J Nutr Educ 2000;32:314-9.

Barnard ND. J Cardiopulm Rehab 2004;24:229-35.

Reilly JK. J Am Dietetic Asso 2006;106:590-593.

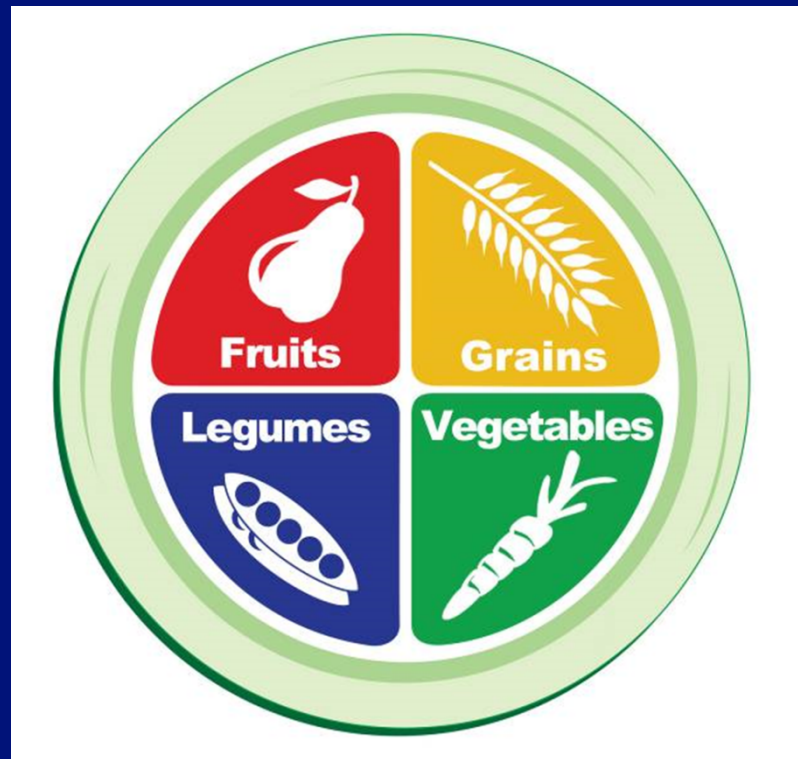
Barnard ND. J Am Diet Assoc 2009;109:263-72.

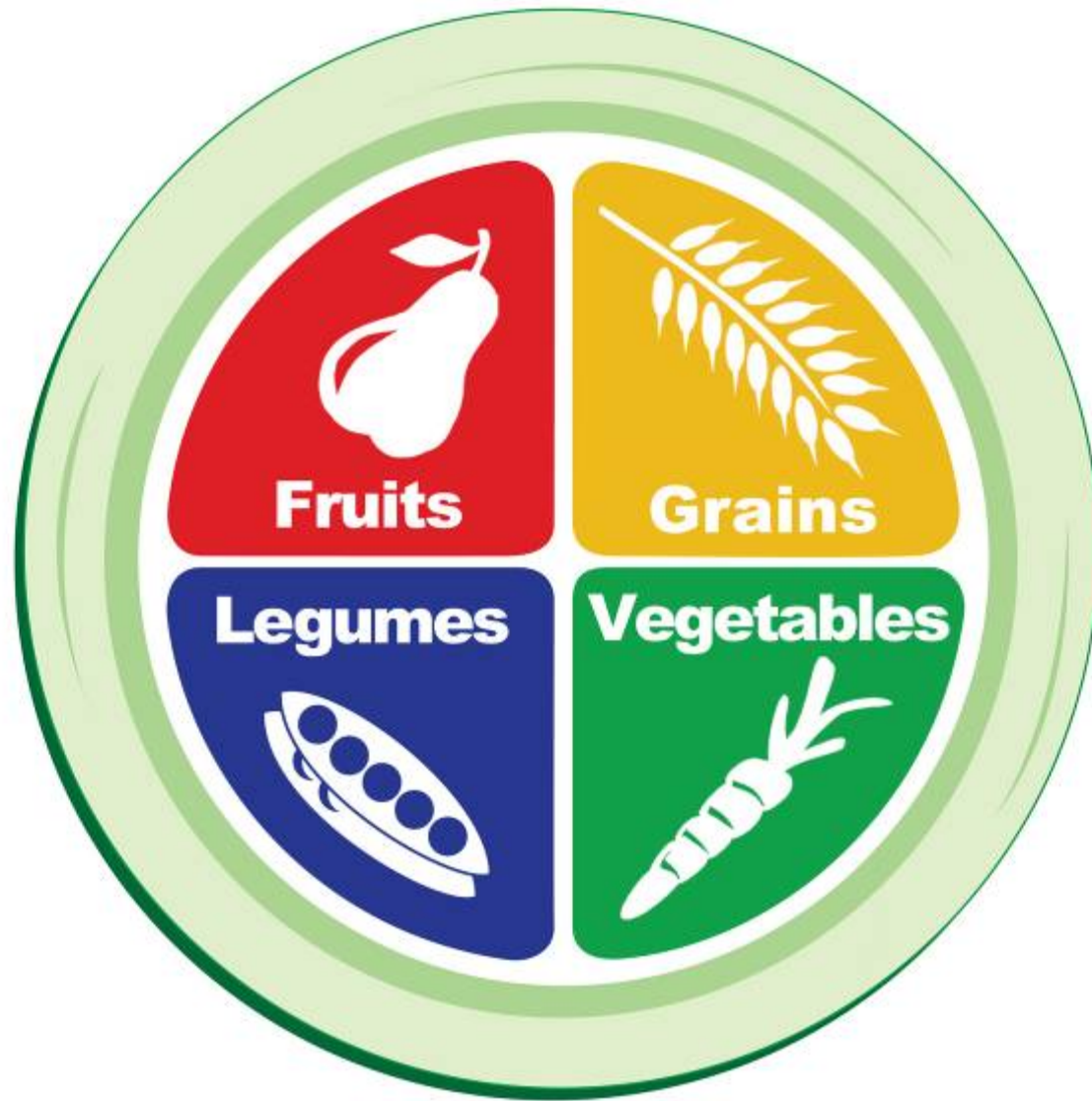
Eckart J. FI Publ Health Rev 2010;7:64-68.

Katcher HI. Ann Nutr Metab, 2010;56:245-52.

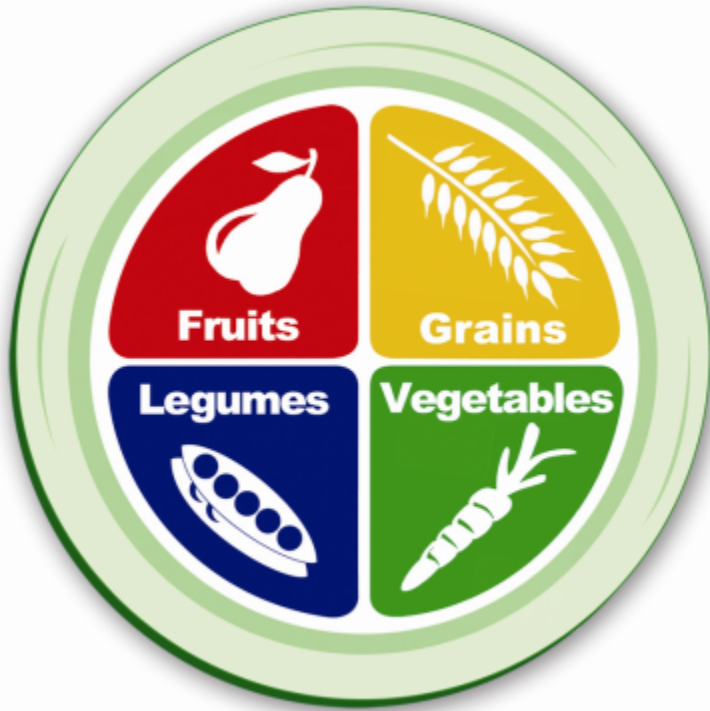
What We Don't Know

Relative value of food groups

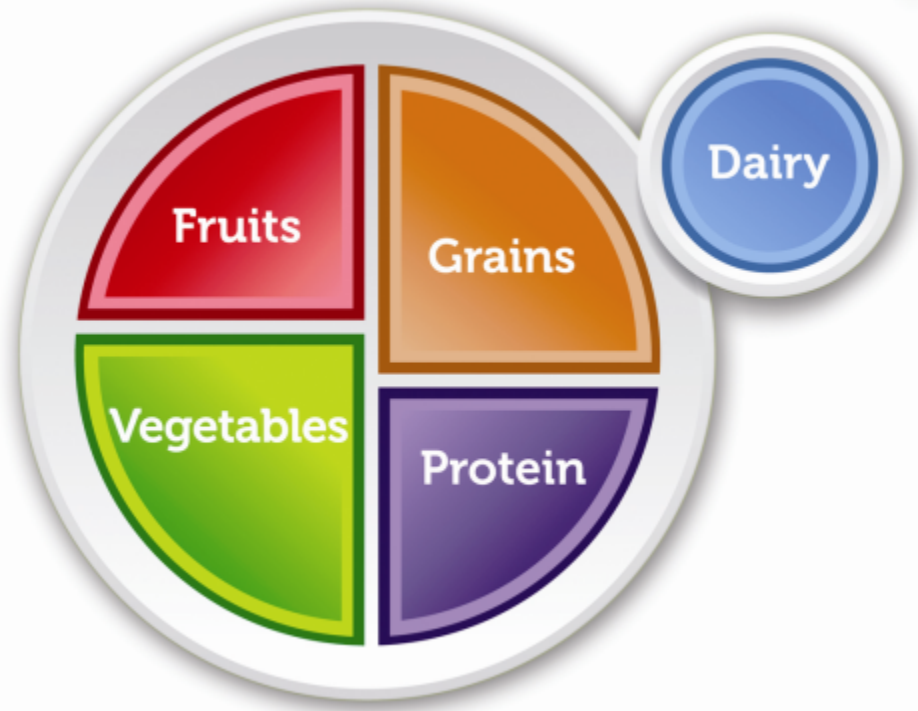




Physicians Committee 2009



USDA's MyPlate 2011



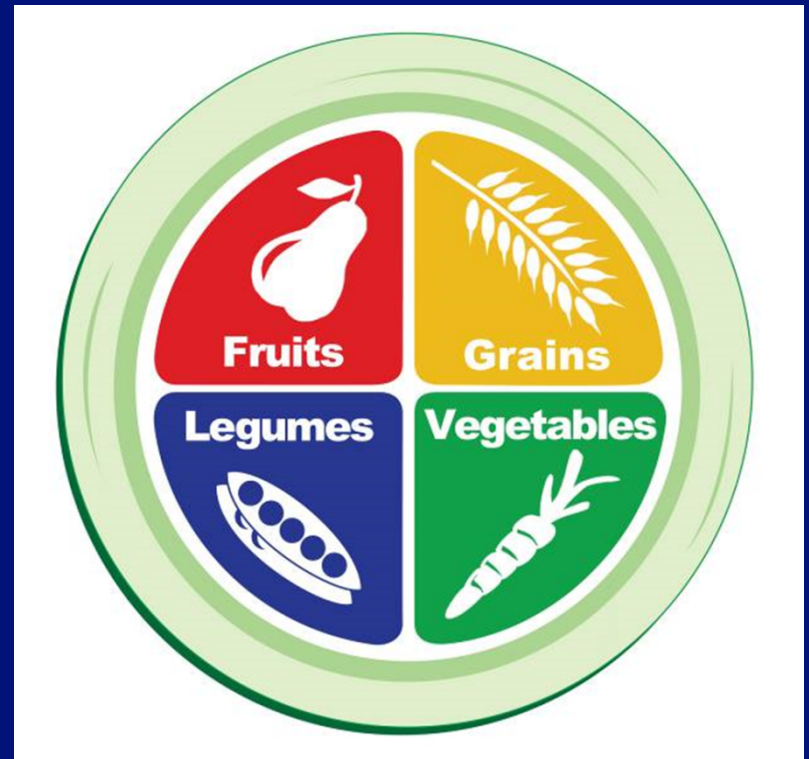
What We Don't Know

Relative value of food groups

Raw vs cooked

Independent effect
of GI

Vitamin B₁₂



Areas of Agreement

1. Vegetables, fruits, legumes, and whole grains should be primary diet staples.
2. Meat (including fish), dairy products, and eggs are optional, not required.
3. There are advantages to simple, relatively unprocessed foods.
4. The only essential beverage is water.

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