

Carbohydrates, Protein, and Fat: What Matters More?

The Diet

(e.g., Low-Fat, Low-Carb, etc.)

or

Diet Quality?

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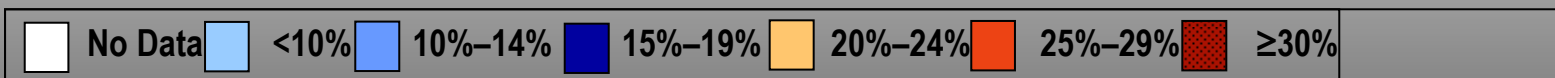
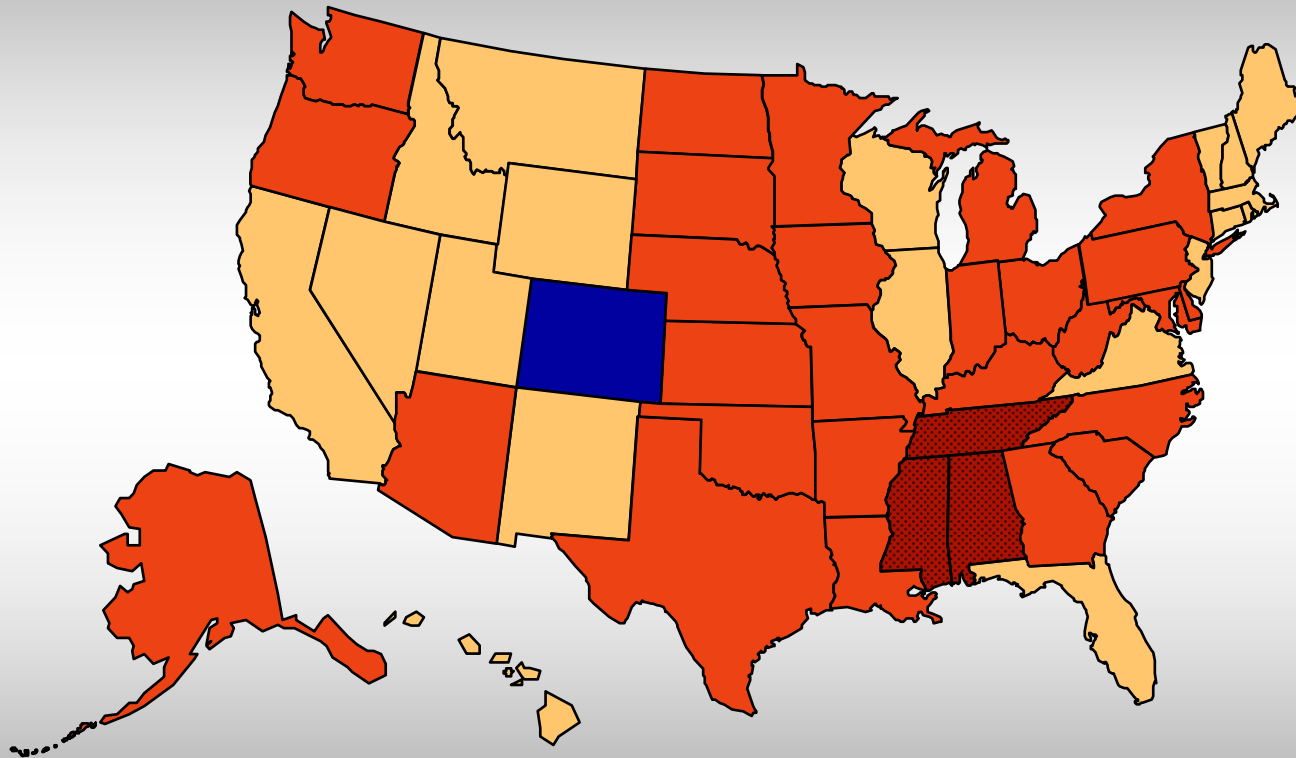
Program in Cardiovascular Epidemiology
Departments of Epidemiology and Nutrition
Harvard School of Public Health



Obesity Trends* Among U.S. Adults

BRFSS, 2007

(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)

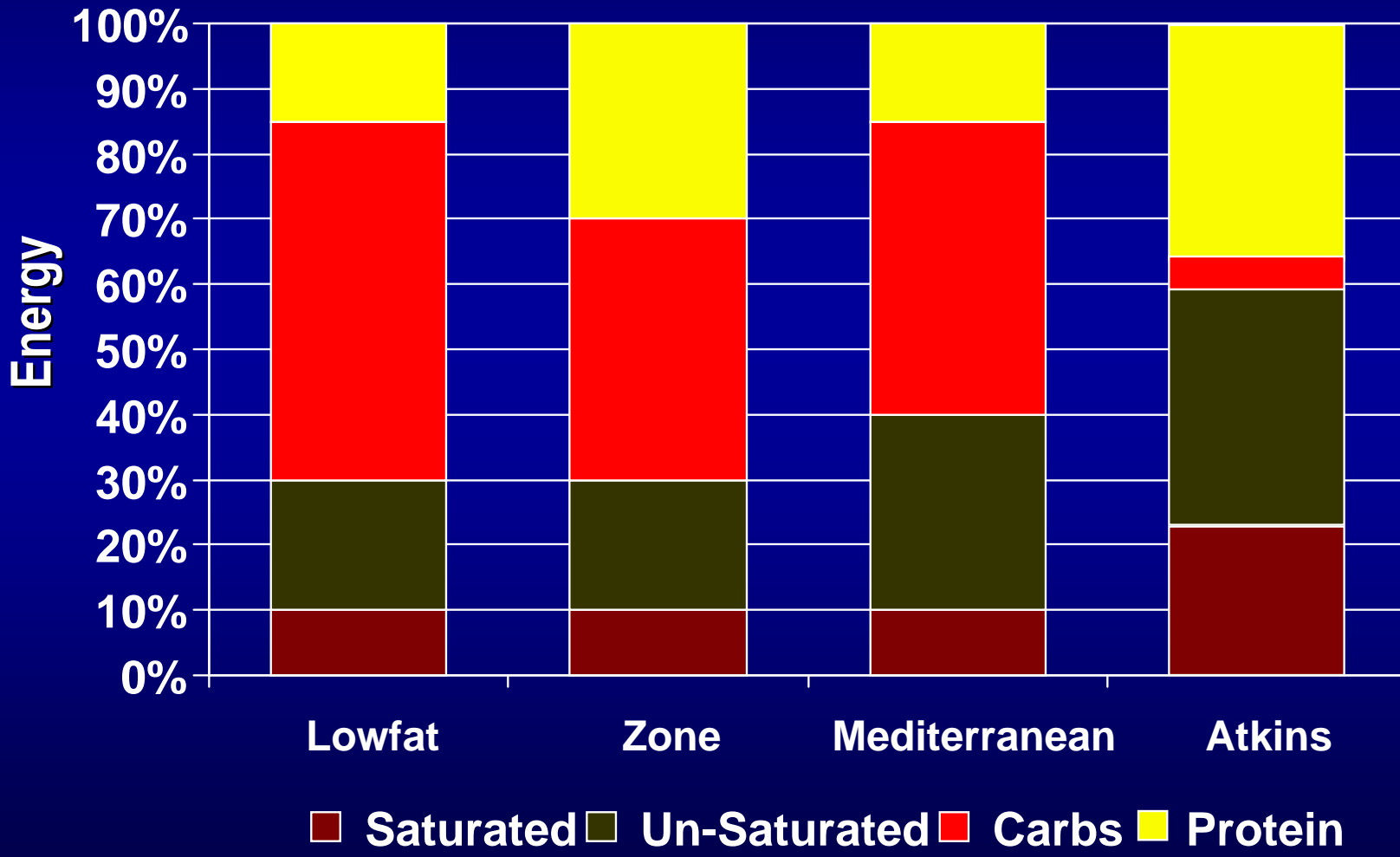


Source: Behavioral Risk Factor Surveillance System, CDC.





What's in a Diet ?



Strict Vegetarian Low-Fat Diets Caused Weight Loss

- **Strict Vegetarians in Boston**
 - 73 men, 43 women, mostly in their 20's, adherent for 3 years
 - Fat 22%, Carb 65%, Protein 13%, High Fiber
 - Whole grains only; loads of vegetables
 - No white flour or sugar, few sweets, little fruit juice
 - Matched for age and sex with nearby nonvegetarians
 - Body weight: 128 lb (58 kg) vs 161 lb (73 kg)
= a 33 pound difference !!

Sacks FM et al. N Engl J Med 1975;292:1148

Superiority of Very Low Fat Vegan Diet Compared to Standard Low-fat in 2 y: Effect of diet type and behavioral support

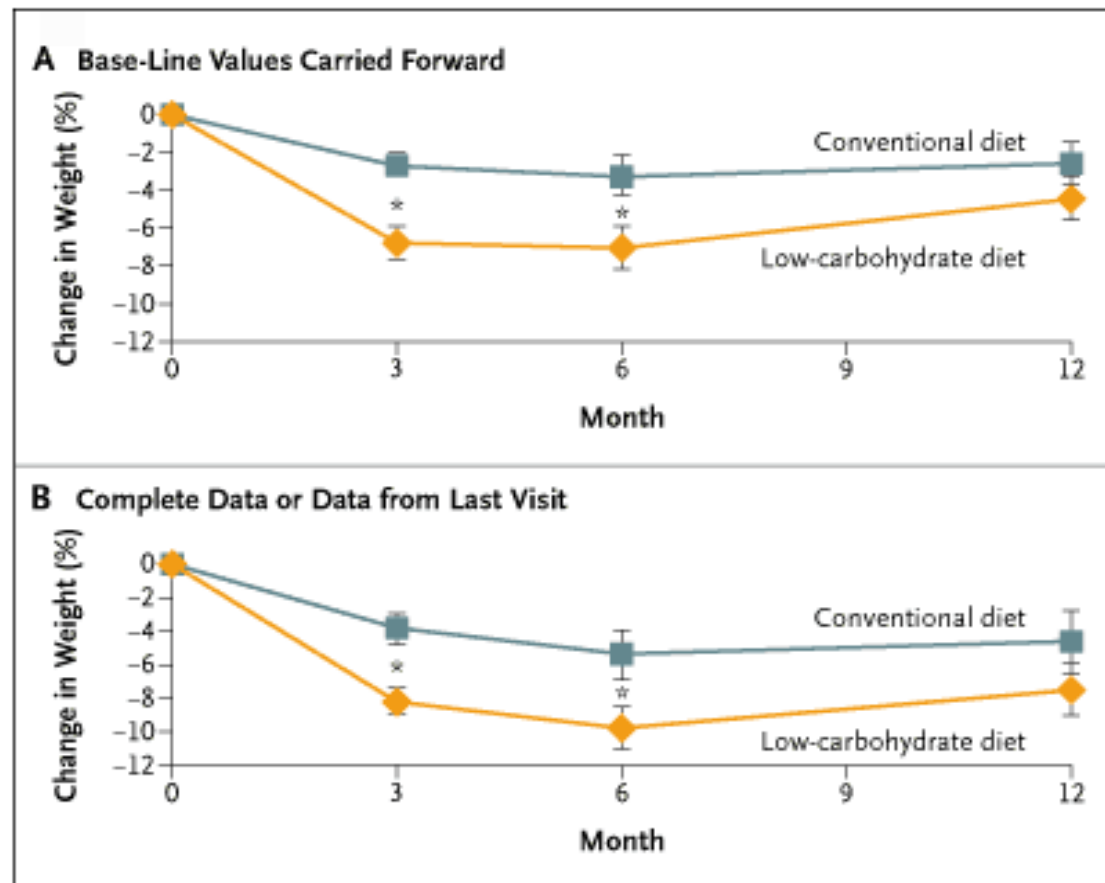
- **Vegan**
 - With support after 3 months: -5.3 kg
 - Without support: -0.4 kg
- **Standard low-fat**
 - With support: -2.7 kg
 - Without support: -0.5 kg

N=14-17 per group

P<0.05 for diet type and support

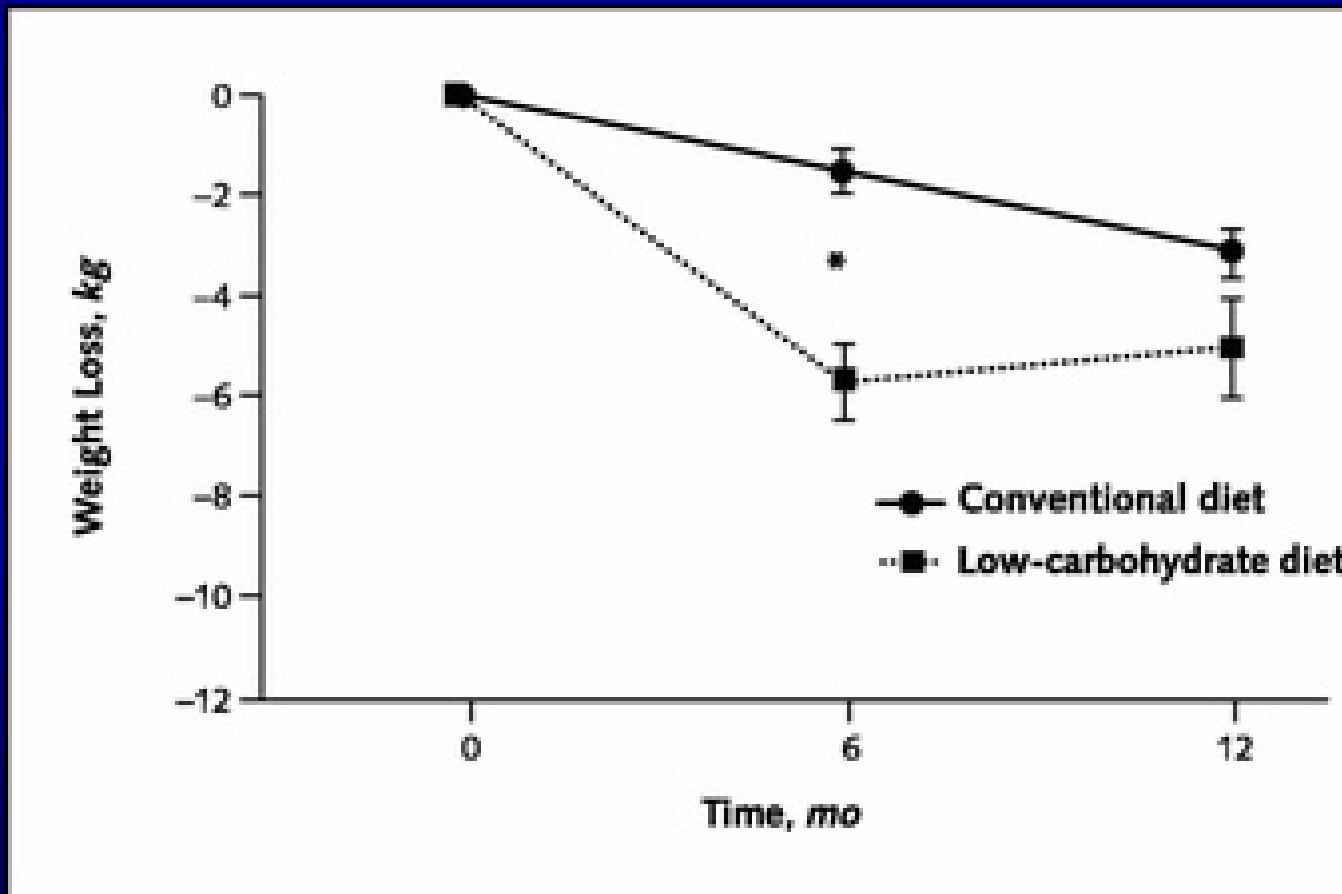
Low-Carbohydrate Diets

Low-Fat vs Atkins Diet



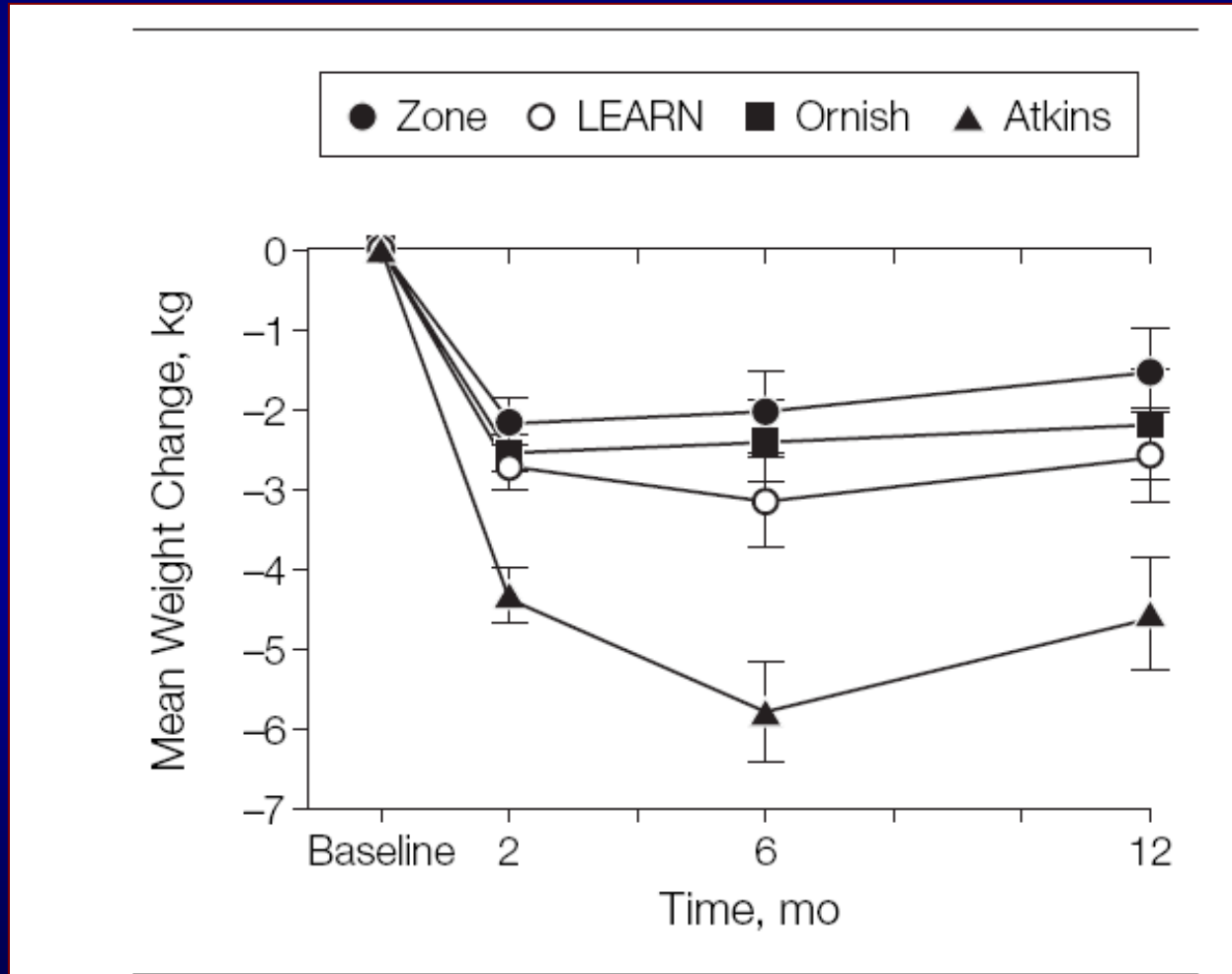
Foster et al
NEJM 2003

Low-Carb Diet vs Low-Fat Diet for Weight Loss



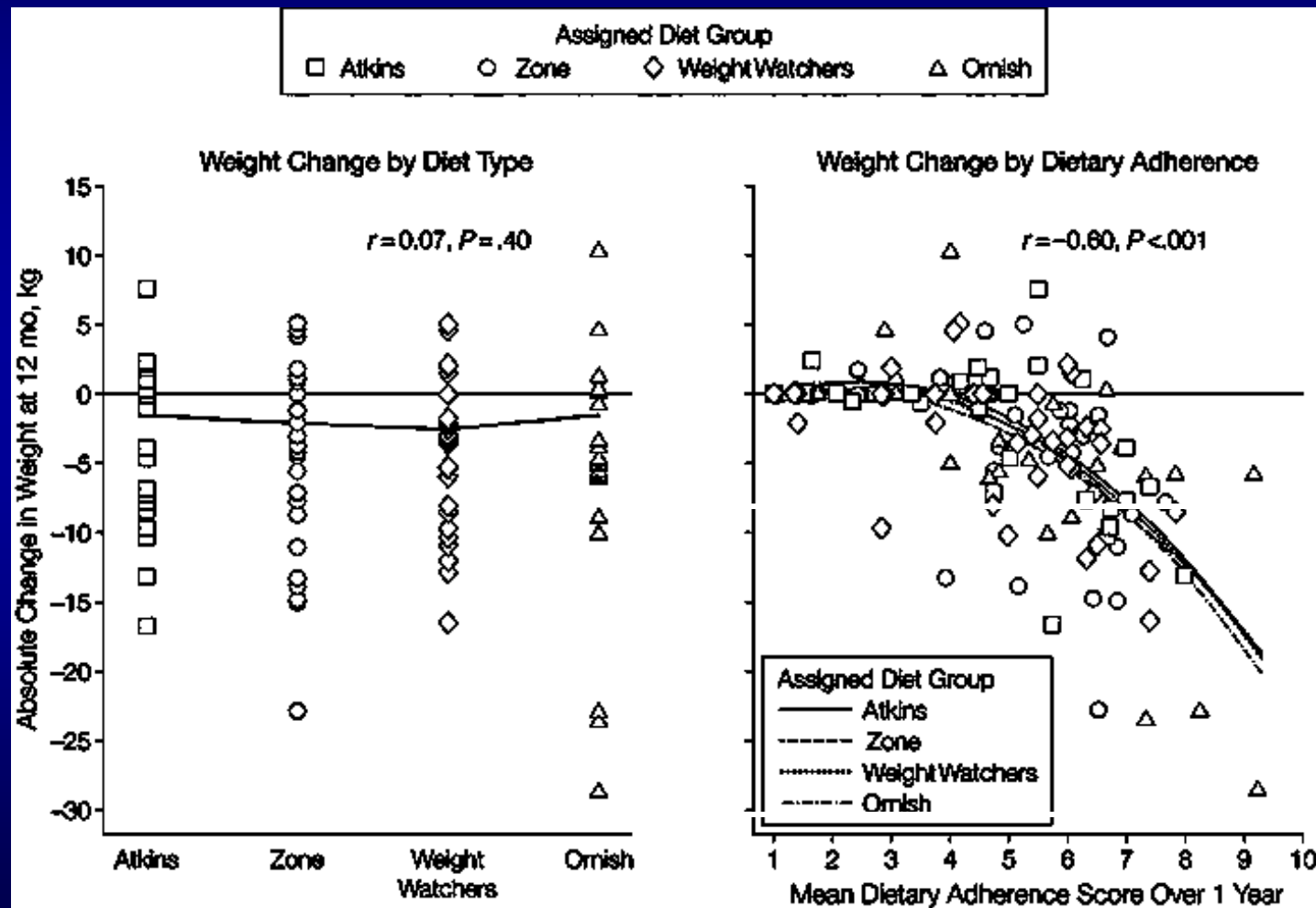
Stern L...Samaha F. Ann Intern Med 2004;140:769

Slightly Better Result with Low-Carb Compared to Calorie Control or Very Low-fat



Gardner C. et al. JAMA 2007

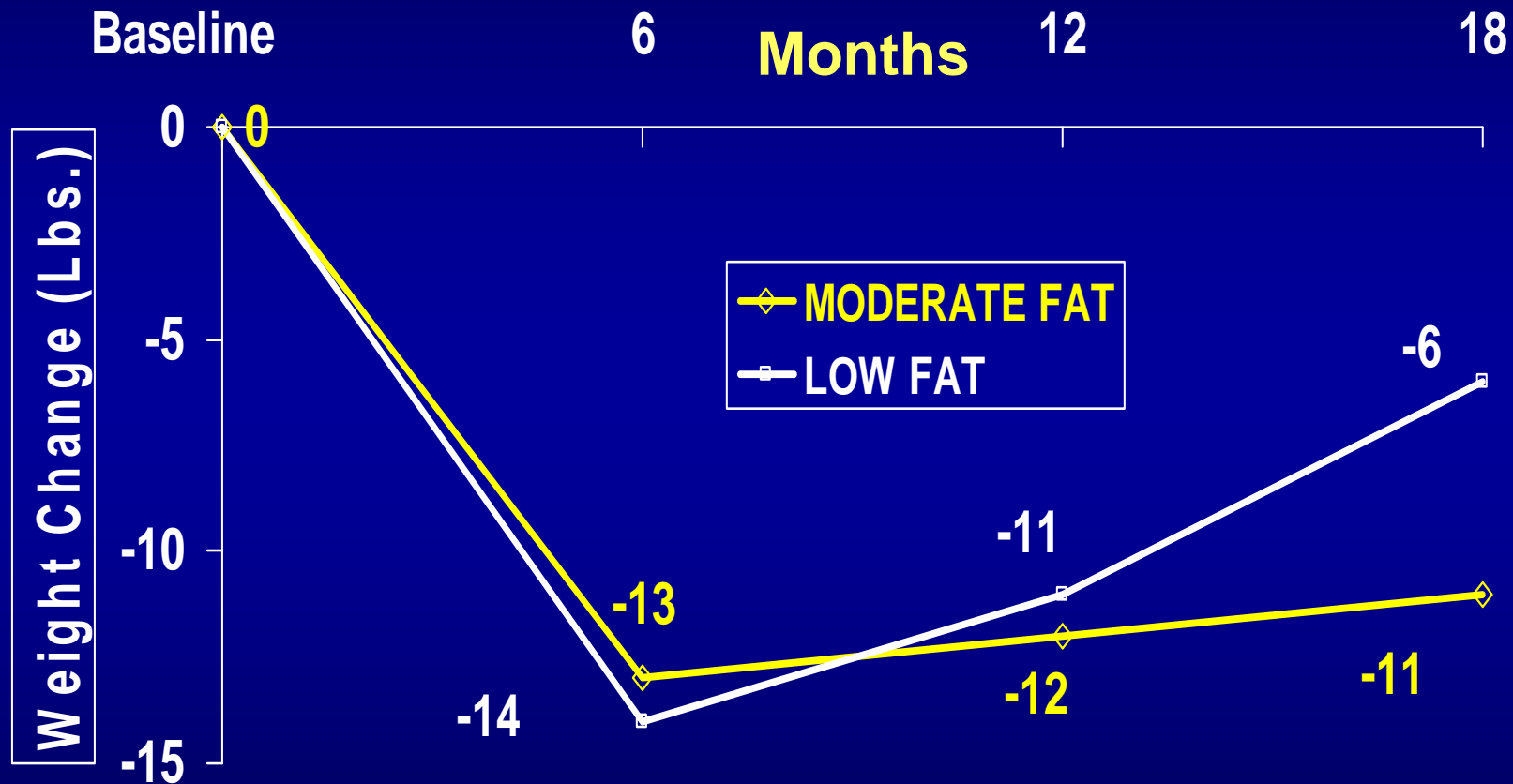
Similar Results with Low-Carb, Calorie Control or Very Low-Fat: Counseling by Diet Book



Dansinger..Schaefer. JAMA 2005;293:43

Higher-Fat Mediterranean-Style Diets

Superiority of High-Unsaturated Fat, Mediterranean-style diet for weight loss

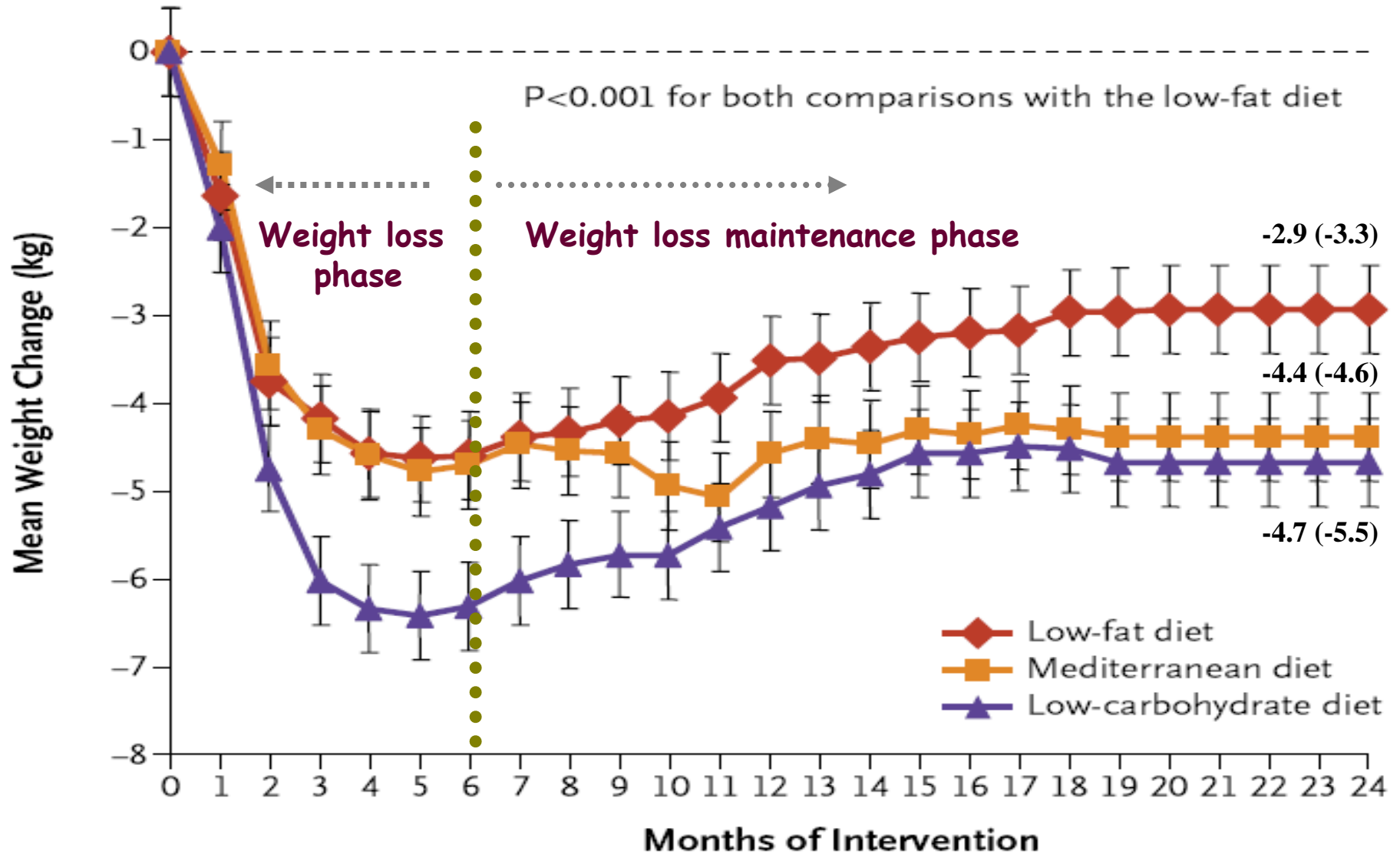


McManus, Antinoro, Sacks. Int J Obesity 2001;25: 1503-11

Weight Gain in the Dropouts: Mediterranean and Low-Fat Groups Combined

- **Dropouts had a net gain in weight of 9 pounds from the starting weight after 18 months.**
- **Those staying in the program lost 11 pounds.**

What if adherence is good?



Interpretation of Comparative Weight Loss Trials

- **Divergent results among studies**
- **Each diet type showed superiority over other types in certain trials.**
- **No obvious pattern of results favoring a specific fat, carb or protein content for weight loss.**
- **Superiority of a diet type in the first 3-6 months often not sustained by 1 to 2 y.**
- **The more support the better!**

Limitations in *Some* Comparative Trials of Diet Types and Weight Loss

- **Short duration, most lasted a few months.**
- **Some control groups had lower intensity of intervention**
- **Underrepresentation of men**
- **Large percentage of dropouts, up to 50%**
- **Novelty of one of the diets, media attention, and its marketing may have affected expectations of success.**

Pounds Lost Trial Organization: Study Sites, Researchers, Funding

- **Harvard School of Public Health and Brigham & Women's Hospital, Boston; F. Sacks, PI,**
- **Pennington Biomedical Research Center, Louisiana State University System, Baton Rouge, G. Bray PI;**
- **Investigator Initiated proposal to NHLBI funded by cooperative agreement grant to Harvard School of Public Health.**

Sacks FM et al. N Engl J Med Feb 26, 2009

PoundsLost Trial: Diets

- 1. Low-fat (20%), average protein (15%), highest carbohydrate (65%)**
- 2. Low-fat (20%), high protein (25%), carbohydrate (55%)**
- 3. High fat (40%), average protein (15%), carbohydrate (45%)**
- 4. High fat (40%), high protein (25%), lowest carbohydrate (35%)**

Similar foods used for all diets but in different proportions. All dietary approaches adhered to healthful guidelines to prevent cardiovascular disease.

Dietary Program for Weight Loss

- **Macronutrient targets were the paramount teaching objective.**
- **Specified menus for 2 week cycles for each group.**
- **Participants taught to follow meal plans exactly.**
- **Energy reduction goal was 750 Kcal daily**
- **Physical activity goal was 90 minutes per week**

Dietary Program for Weight Loss

- **Same technique and intensity for all groups**
- **Group sessions:**
 - **3 of every 4 weeks x 6 months, then 2 of every 4 weeks**
- **Individual counseling sessions:**
 - **Every 8 wks for 2 yr**
- **Web-based system for participants to record diet and exercise and obtain rapid feedback on goals.**
- **Contact among groups avoided**
- **Investigators and staff taught participants that each diet had an equal chance of success in line with divergent results of past studies.**

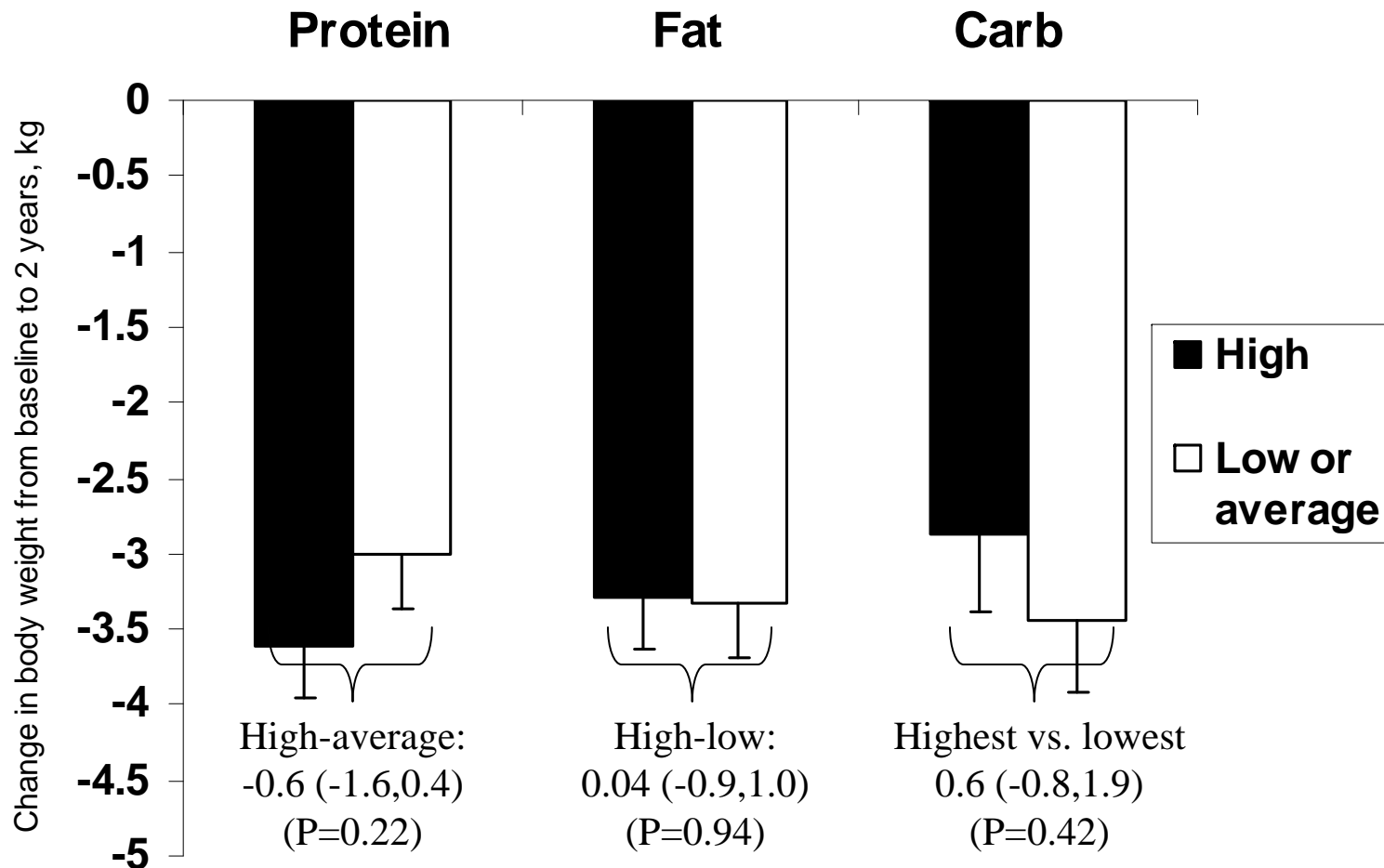
Baseline Characteristics

	All	Completers
• Number	811	645 (80%)
• Age	51	52
• Women	64%	62%
• White race	79%	81%
• BMI, mean	33	33 kg/m ²
• BMI 25-30	27%	28%
• BMI \geq 30	73%	72%
• Waist circumference	103 cm	104 cm
• Completed college	68%	69%
• Attended college	22%	20%
• Married	70%	69%

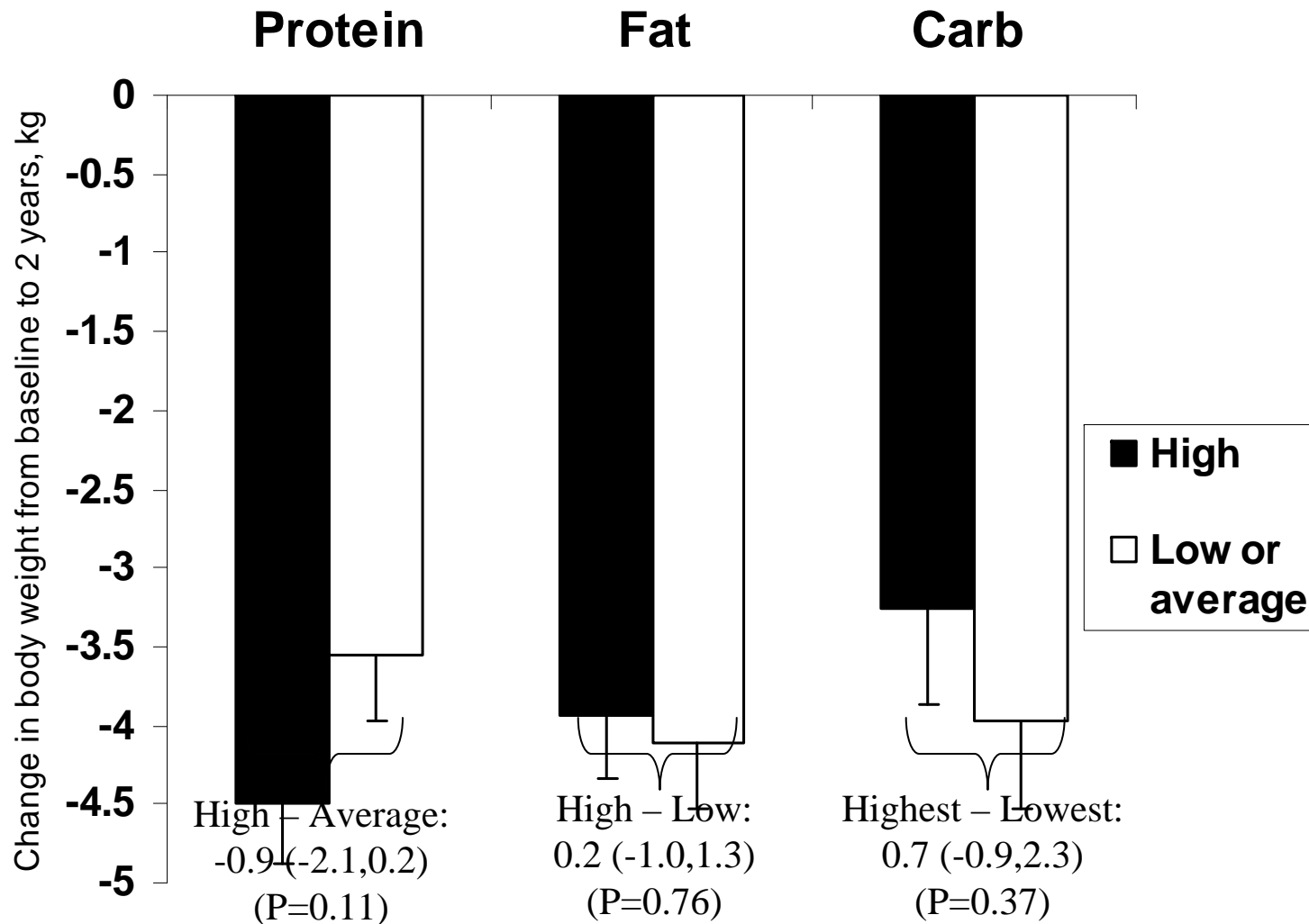
PoundsLost: Primary Trial Outcome

2 year Body Weight Change

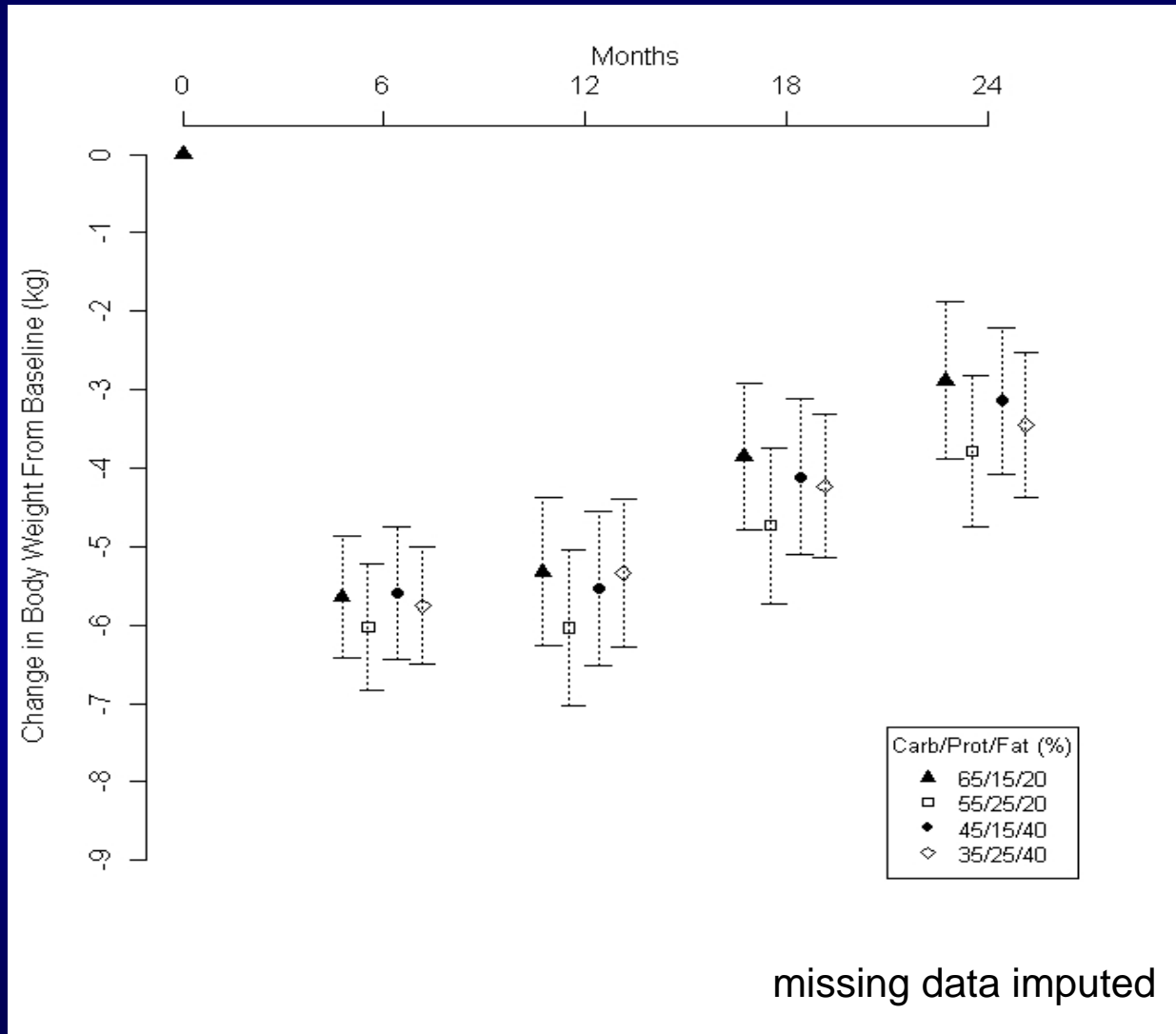
All randomized participants



PoundsLost. Body Weight Change 2 years: Completers, N=645 (80%).



PoundsLost, Body weight change each diet: All randomized participants, N=811.



Sacks FM et al. N Engl J Med Feb 26, 2009

POUNDS LOST Waist circumference in Completers

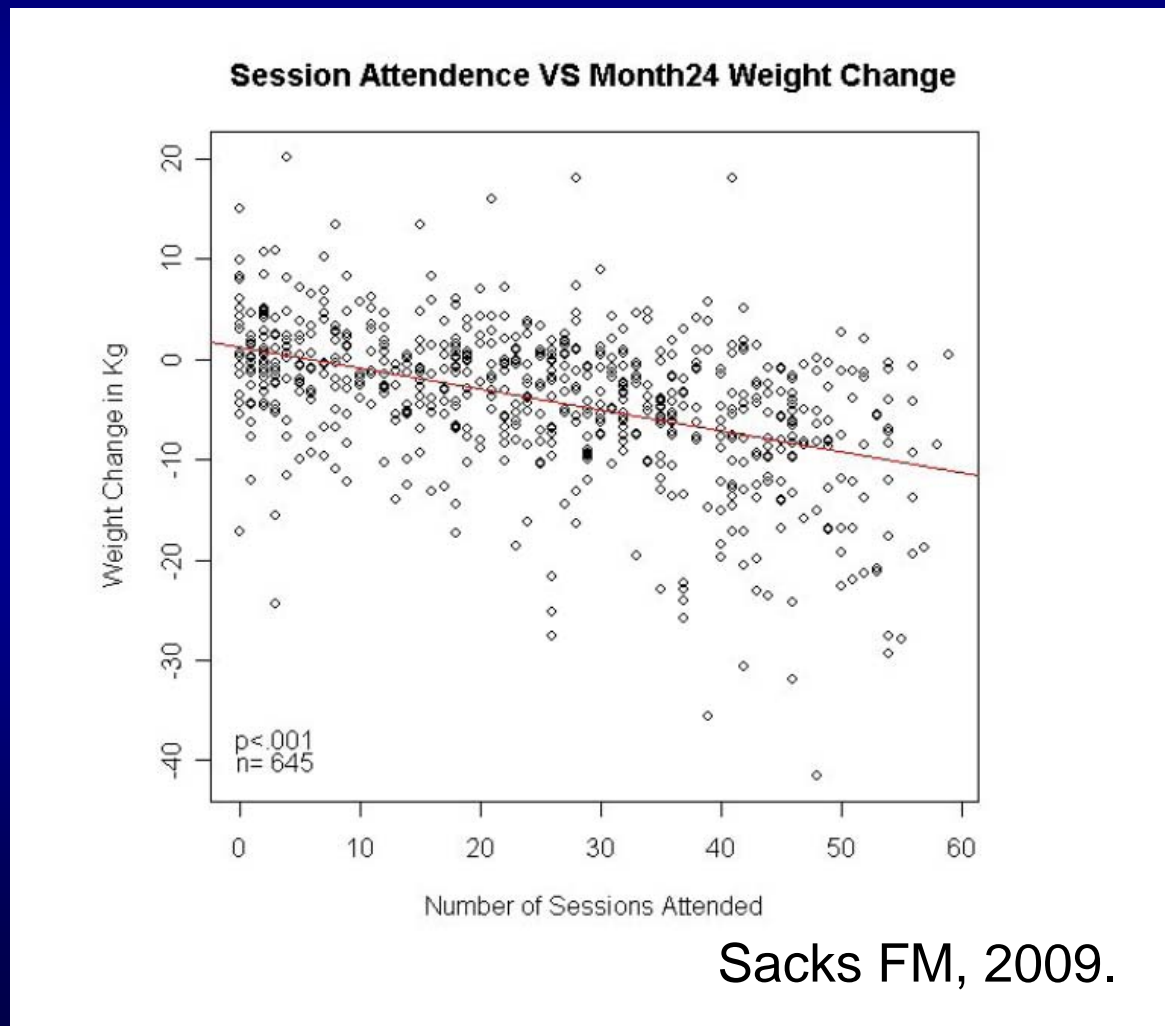


Sacks FM et al. N Engl J Med Feb 26, 2009

Continued Weight Loss: from 6 months to 2 years

- **23% lost weight after 6 months**
- **Mean additional weight loss = 3.6 kg**
- **Total weight loss = 9.3 kg**
- **No differences among the diets**

Group Session Attendance and Weight Loss at 2 years: Total Group = 0.2 kg per session attended



Weight Loss: Therapeutic Techniques

- **“Self-help” vs Weight Watchers, 2 years**
 - **Self-help: 2 dietitian consultations**
 - **Weight Loss = 0.5 pounds**
 - **Weight Watchers: weekly meetings**
 - **Weight Loss = 6.4 pounds overall, 11 pounds in good attenders**
- **Internet behavioral “e-counseling”**
 - **10 pound weight loss at 1 year**

Heshka S et al; Tate D et al. JAMA, April 9, 2003

Carbohydrate/Protein/Fat: Target and Reported Intakes

Diet Type	Target	6 month	2 year
Low-Fat, Av-Prot	65/15/20	58/18/26	53/20/26
Low-Fat, Hi-Prot	55/25/20	53/22/26	51/21/28
Hi-Fat, Av-Prot	45/15/40	49/18/34	49/20/33
Hi-Fat, Hi-Prot	35/25/40	43/23/34	43/21/35

Serum lipid and insulin changes at 2 years.

- Change in LDL:HDL ratio was similar
- Low Carb diets
 - Greater decline in TG
 - Greater decline in Insulin

Summary

- Reduced calorie diets achieve similar weight loss after 2 years regardless of emphasis on fat, carbohydrate or protein.
- Diet satisfaction, satiety, cravings similar with all approaches.
- Average weight loss = 9 pounds
- Average reduction in waist circumference = 2 inches
- Favorable changes in serum lipid risk factors and serum insulin

Overall Conclusions

- Successful diets for weight loss can emphasize a large range of macronutrient intakes.
- These diets are made with foods that reduce risk of cardiovascular disease.
- Serum lipids and insulin are improved on all such diets.
- Ongoing counseling sessions are important to achieve and maintain weight loss in all groups.
- Successful diets for weight loss can be tailored to individual patients' personal and cultural preferences to achieve long-term success.

Messages on Diet and Weight Control

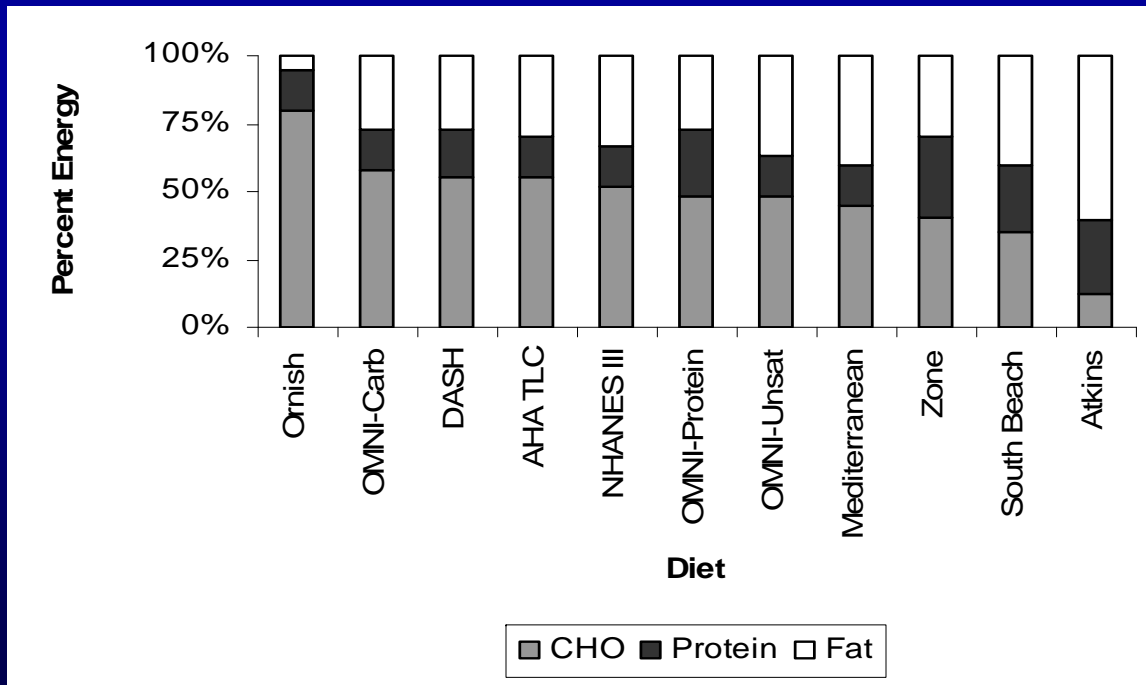
- All calories count
- Support others in controlling their weight

If you love them, don't stuff them!

Comparison of DASH and Omni Diets with Popular

*High Carbohydrate
Low Fat
Moderate Protein*

*Low Carbohydrate
High Fat
High Protein*



Diet Quality Improves Health in Overweight People *Even if they don't lose weight!!*

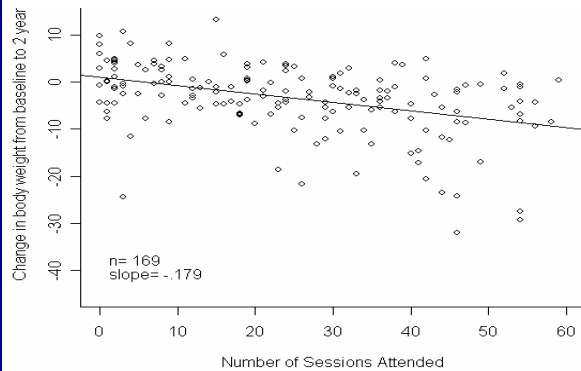
- **DASH and OmniHeart studies improved diet quality and kept body weight constant.**
- **50% of the research participants were obese; 25% overweight**

Message on Diet and Weight Control

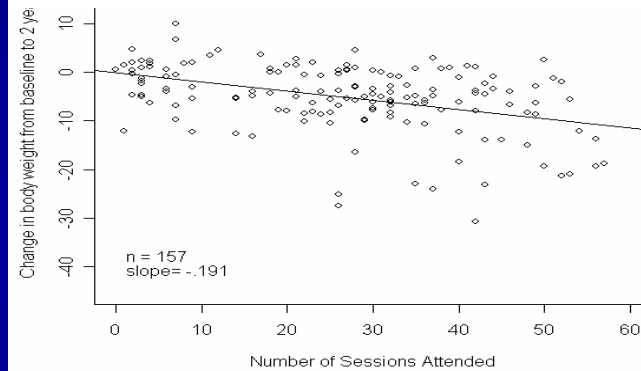
- All calories count – watch portion sizes and let the scales be your guide
- Avoid sweetened beverages entirely. Limit fruit juice to one glass per day
- Replace refined grains with whole grain versions. The less processed and more intact the grain, the better.
- Eat at least 5 servings of fruits and vegetables per day
- Make sweets an occasional event
- Support others in controlling their weight
 - If you love them, don't stuff them!

Group Session Attendance and Weight Loss: Similar in each diet group

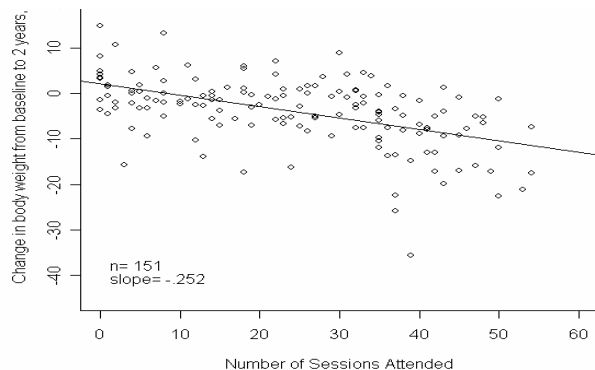
Ave Prot, Low-Fat
Slope = -0.18 kg/session



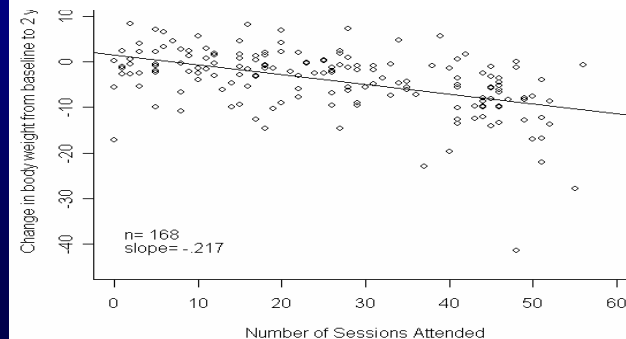
High Prot, Low-Fat
Slope = -0.19 kg/session



Ave Prot, High-Fat
Slope = -0.25 kg/session



High Prot, High-Fat
Slope = -0.22 kg/session



Vegetarian Low-Fat Diets Caused Weight Loss

- **20 Coronary Disease Patients, San Francisco**
 - **Fat <10%, meals provided**
 - **Body weight:**
 - **Baseline: 200 lb (91 kg)**
 - **After 1 year: 178 lb (81 kg)**
 - **After 5 years: 183 lb (83 kg)**
 - **Control group increased 5 lb (2 kg)**
 - **Difference = 22 pounds**

**Gould KL et al. JAMA 1995;274:894
Ornish D et al. Lancet 1990;336:129**