



How Do We Treat Obesity?

Lifestyle Intervention



AACE OBESITY RESOURCE CENTER

AACE ONLINE ENDOCRINE ACADEMY

Why Is Lifestyle Weight Management Important?

- Improved metabolic control
 - Lower fasting blood glucose and prevent T2D
 - Lower blood pressure and lipid profile
 - Reduce need for pharmacologic therapy for metabolic complications associated with obesity
- Improved quality of life
 - Less musculoskeletal weight-bearing joint pain
 - Improved GERD, OSA, reactive airway disease
- Increased life expectancy
 - Lower incidence of certain cancers

GERD = gastroesophageal reflux disease; OSA = obstructive sleep apnea; T2D = type 2 diabetes.

Lean ME, et al. *Diabet Med.* 1990;7:228-233. Wing RR, et al. *Arch Intern Med* 1987;147:1749-1745. Schotte DE, et al. *Arch Intern Med.* 1990;150:1701-1704.. Dattilo AM, Kris-Etherton PM. *Am J Clin Nutr.* 1992;56:320-328. Bianchini F, et al. *Obesity Rev.* 2002;3:5-8. Wadden TA, et al. *Obesity (Silver Spring).* 2011;19:1987-1998.



3.

Treatment Based on Clinical Judgment

LIFESTYLE THERAPY

Evidence-based lifestyle therapy for treatment of obesity should include 3 components

MEAL PLAN	PHYSICAL ACTIVITY	BEHAVIOR
<ul style="list-style-type: none"> • Reduced-calorie healthy meal plan • ~500–750 kcal daily deficit • Individualize based on personal and cultural preferences • Meal plans can include: Mediterranean, DASH, low-carb, low-fat, volumetric, high protein, vegetarian • Meal replacements • Very low-calorie diet is an option in selected patients and requires medical supervision <p>Team member or expertise: dietitian, health educator</p>	<ul style="list-style-type: none"> • Voluntary aerobic physical activity progressing to >150 minutes/week performed on 3–5 separate days per week • Resistance exercise: single-set repetitions involving major muscle groups, 2–3 times per week • Reduce sedentary behavior • Individualize program based on preferences and take into account physical limitations <p>Team member or expertise: exercise trainer, physical activity coach, physical/occupational therapist</p>	<p>An interventional package that includes any number of the following:</p> <ul style="list-style-type: none"> • Self-monitoring (food intake, exercise, weight) • Goal setting • Education (face-to-face meetings, group sessions, remote technologies) • Problem-solving strategies • Stimulus control • Behavioral contracting • Stress reduction • Psychological evaluation, counseling, and treatment when needed • Cognitive restructuring • Motivational interviewing • Mobilization of social support structures <p>Team member or expertise: health educator, behaviorist, clinical psychologist, psychiatrist</p>

Components of Therapeutic Lifestyle Change

- Nutrition
 - Reduced calorie meal plans
 - Healthy eating patterns
- Physical activity
- Healthy behavior habits
 - Limited alcohol consumption
 - Sufficient sleep
 - Stress reduction (to include behavioral therapy as necessary)

Intensification of Lifestyle Therapies to Achieve Weight Loss Goals

INTENSIFICATION

- Simple advice to lose weight in doctor's office
- Internet programs or self-help books
- Advice from dietitian
- Structured programs (Weight Watchers, YMCA, telecommunication)
- Multidisciplinary structured programs
- Physician-driven individualized structured programs

Impart skills and behavior change to induce and maintain weight loss



Lifestyle Intervention
Nutrition

Reduced Calorie Meal Plans

	Recommendation
General eating habits	<ul style="list-style-type: none">▪ Regular meals and snacks; avoid fasting to lose weight▪ Plant-based nutrition (high in fiber, low calories, low glycemic index, high in phytochemicals/antioxidants)▪ Understand Nutrition Facts Label information▪ Incorporate beliefs and culture into discussions▪ Informal physician-patient discussions▪ Use mild cooking techniques instead of high-heat cooking

**A negative energy balance
is necessary to achieve weight loss**

Nutritional Components

	Recommendation
Carbohydrates	<ul style="list-style-type: none">▪ Understand health effects of the 3 types of carbohydrates: sugars, starch, and fiber▪ Target 7-10 servings per day of healthful carbohydrates (fresh fruits and vegetables, pulses, whole grains)▪ Lower-glycemic index foods may facilitate glycemic control:* multigrain bread, pumpernickel bread, whole oats, legumes, apple, lentils, chickpeas, mango, yams, brown rice
Fat	<ul style="list-style-type: none">▪ Eat healthful fats: low-mercury/low-contaminant-containing nuts, avocado, certain plant oils, fish▪ Limit saturated fats (butter, fatty red meats, tropical plant oils, fast foods) and trans fats▪ Use no- or low-fat dairy products
Protein	<ul style="list-style-type: none">▪ Consume protein from foods low in saturated fats (fish, egg whites, beans)▪ Avoid or limit processed meats
Micronutrients	<ul style="list-style-type: none">▪ Routine supplementation not necessary except for patients at risk of insufficiency or deficiency▪ Chromium; vanadium; magnesium; vitamins A, C, and E; and CoQ10 not recommended for glycemic control

*Insufficient evidence to support a formal recommendation to educate patients that sugars have both positive and negative health effects.

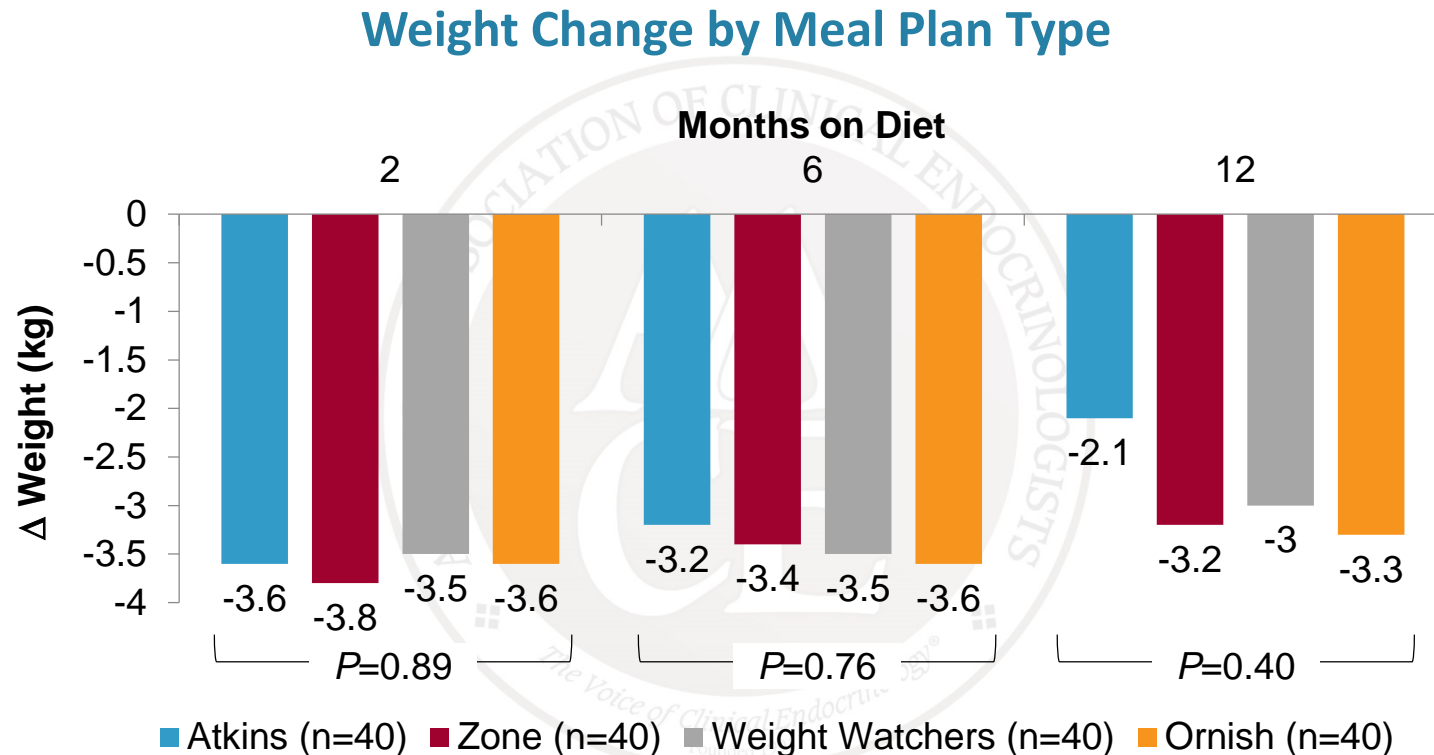
Macronutrient Composition

- Meal patterns enriched in the following are associated with a decrease in insulin sensitivity
 - Total fat
 - Saturated fat
 - Trans-fat
 - Refined grains
- Meal patterns enriched in the following are associated with an increase in insulin sensitivity
 - Fiber
 - Fruits/vegetables
 - Polyunsaturated fats
 - Monounsaturated fats
 - Whole grain

Features of Different Types of Meal Plans

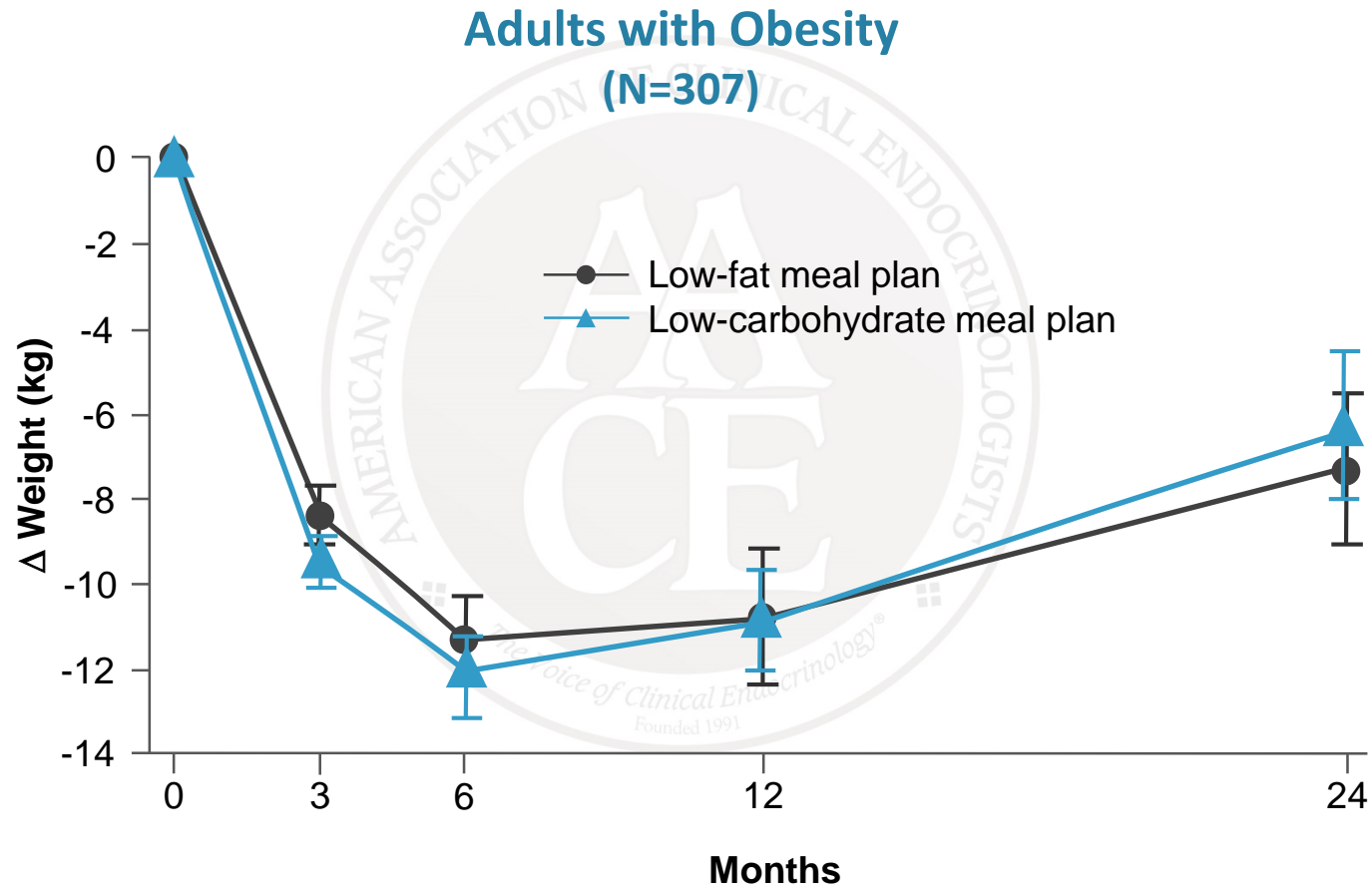
Meal Plan	Calories	Composition	Recommended food choices
Dietary Approaches to Stop Hypertension (DASH)	1600-3100 kcal/day depending on individual needs	<ul style="list-style-type: none"> ≤27% fat calories. ≤6% saturated fat calories. ≤150 mg/day cholesterol. ≤3 g/day sodium. 	Fruits, vegetables, and low-fat dairy foods.
Low-carbohydrate (Atkins)	No restrictions	20 g/day carbohydrates during 2-month induction phase, with gradual increase to ≤120 g/day carbohydrates.	Vegetarian sources of fat and protein preferred. Avoid trans fat.
Low-fat	Women: 1500 kcal/d Men: 1800 kcal/d	<ul style="list-style-type: none"> 30% fat calories. ≤10% saturated fat calories. ≤300 mg/day cholesterol. 	Low-fat grains, vegetables, fruits, and legumes. Limit sweets and high-fat snacks
Mediterranean	Women: 1500 kcal/d Men: 1800 kcal/d	≤35% of calories from fat	Vegetables, poultry, and fish. Main fat source: 30-45 g/day olive oil and 5-7 nuts (<20 g/day). Limited red meat.

Adherence Is More Important Than Meal Plan Type for Weight Loss Success



Although different diet types did not yield significantly different weight loss, greater diet adherence was significantly associated with weight loss ($r=0.60$; $P<0.001$), and participants in the top tertile of lost an average of $\sim 7\%$ of baseline body weight.

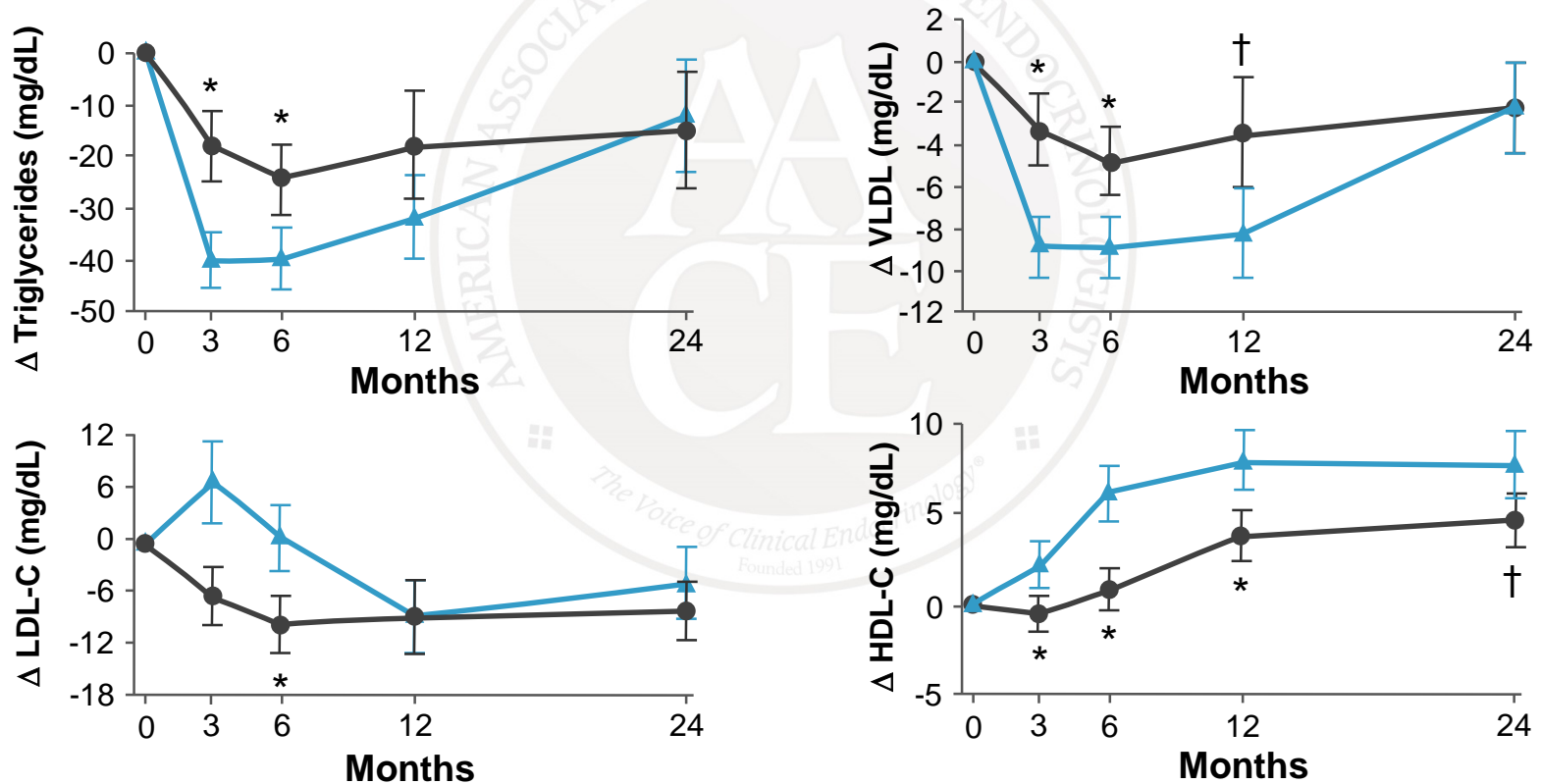
Effect of Low-Fat and Low-Carbohydrate Meal Plans on Weight Over 2 Years



Lipid Effects of Low-Fat and Low-Carbohydrate Meal Plans

Adults with Obesity
(N=307)

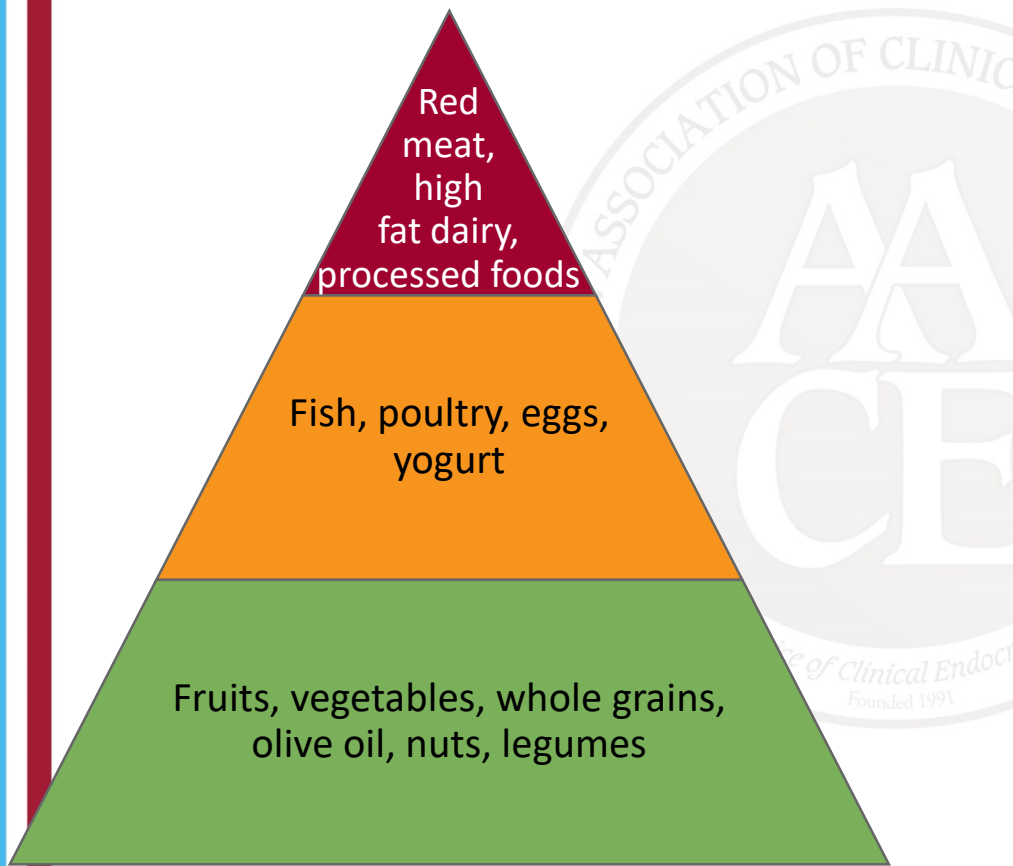
● Low-fat meal plan
▲ Low-carbohydrate meal plan



* $P < 0.001$ between groups. † $P < 0.01$ between groups.

Foster GD, et al. *Ann Intern Med.* 2010;153:147-157.

Healthy Mediterranean Style Eating Pattern



Food Group	Recommended Consumption
Vegetables	2.5 c-eq/day
Fruits	2.5 c-eq/day
Grains	6 oz-eq/day
Whole grains	≥3 oz-eq/day
Dairy	2 c-eq/day
Protein	6.5 oz-eq/day
Seafood	15 oz-eq/week
Meat,* poultry, eggs	25 oz-eq/week
Nuts, seeds, soy	5 oz-eq/week
Oils	27 g/day

*Lean meat preferred.

Effects of Different Diets on Weight

Dietary Intervention Randomized Control Trial (DIRECT) Study Design

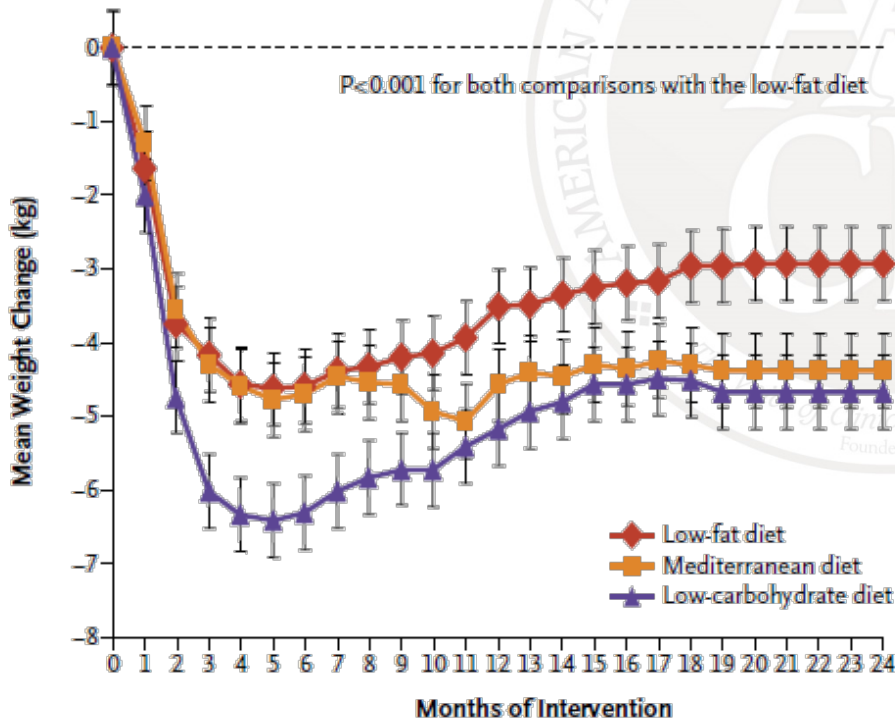
- 322 overweight or obese adults (85% men)
- 2-year study duration
- Randomized, controlled design

Diet group	Calorie Limit	Fat Limit	Characteristic nutrition sources
Low fat	1500 for women 1800 for men	30%	Grains, vegetables, fruits, beans
Mediterranean	1500 for women 1800 for men	35%	Olive oil, nuts, vegetables, fish
Low carbohydrate	None	None	20 g/day of carbohydrate for 2 months, then 120 g/day of carbohydrates Fat, protein, and vegetables

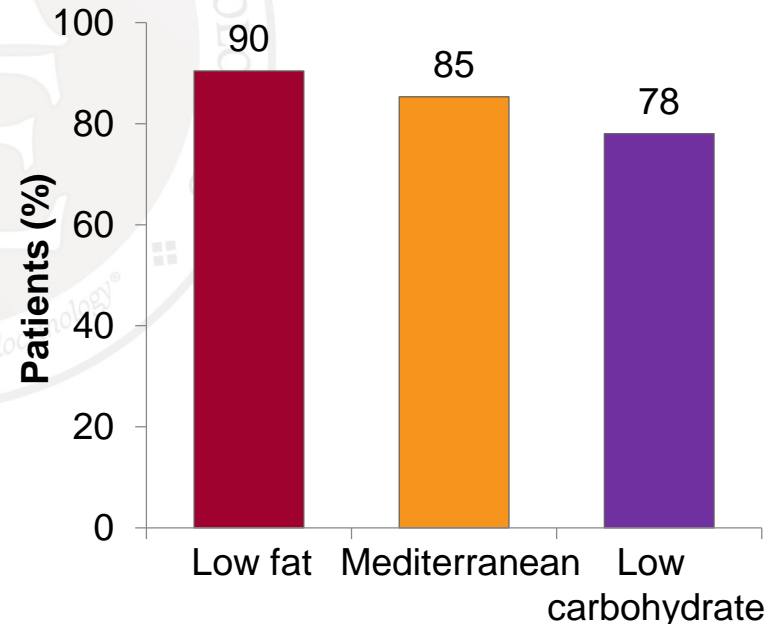
Effect of Low-Fat, Low-Carbohydrate, and Mediterranean Diets on Weight

Dietary Intervention Randomized Control Trial (DIRECT)
(N=322 Adults with Obesity)

Weight Change Over 2 Years

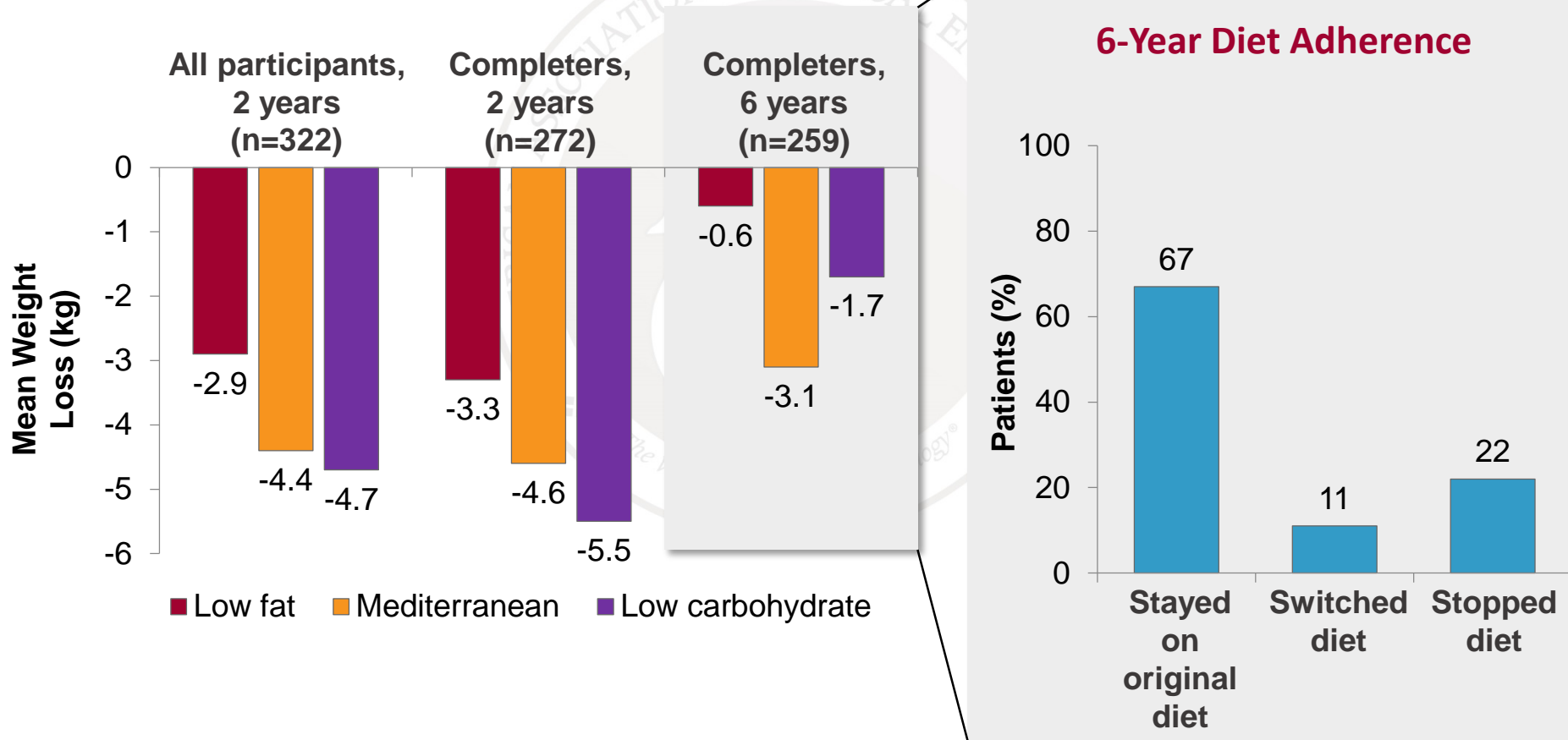


Adherence Over 2 Years



Effects of Different Diets on Weight Over Time

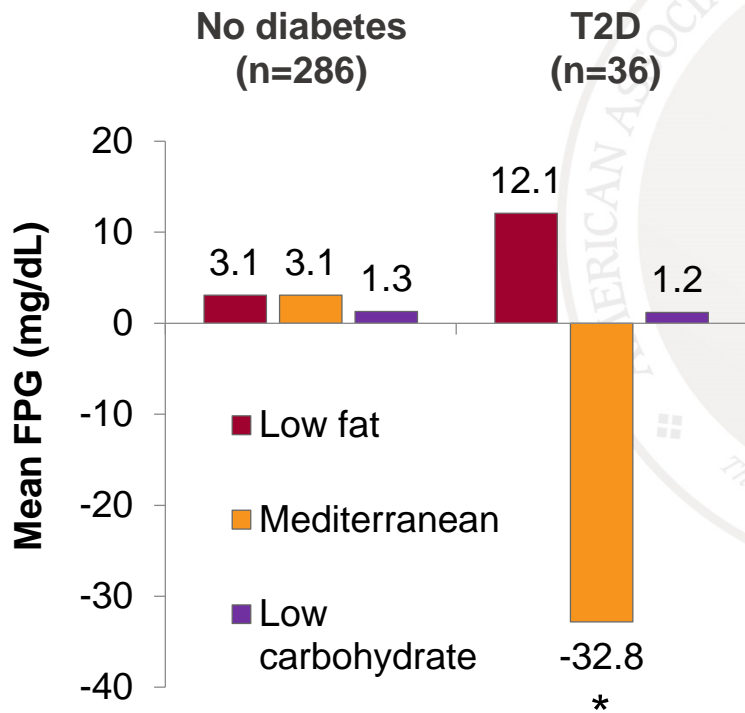
Dietary Intervention Randomized Control Trial (DIRECT)



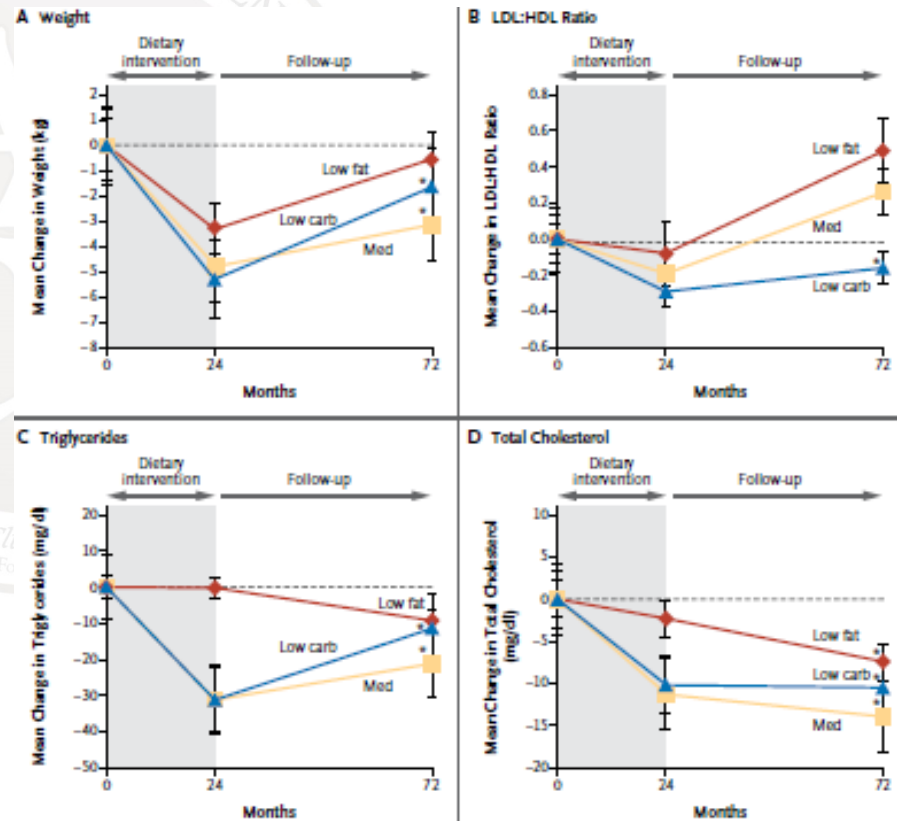
Effects of Different Diets on Glucose and Lipids Over Time

Dietary Intervention Randomized Control Trial (DIRECT)

Effect on FPG at 2 Years



Effect on Lipids at 2 and 6 Years



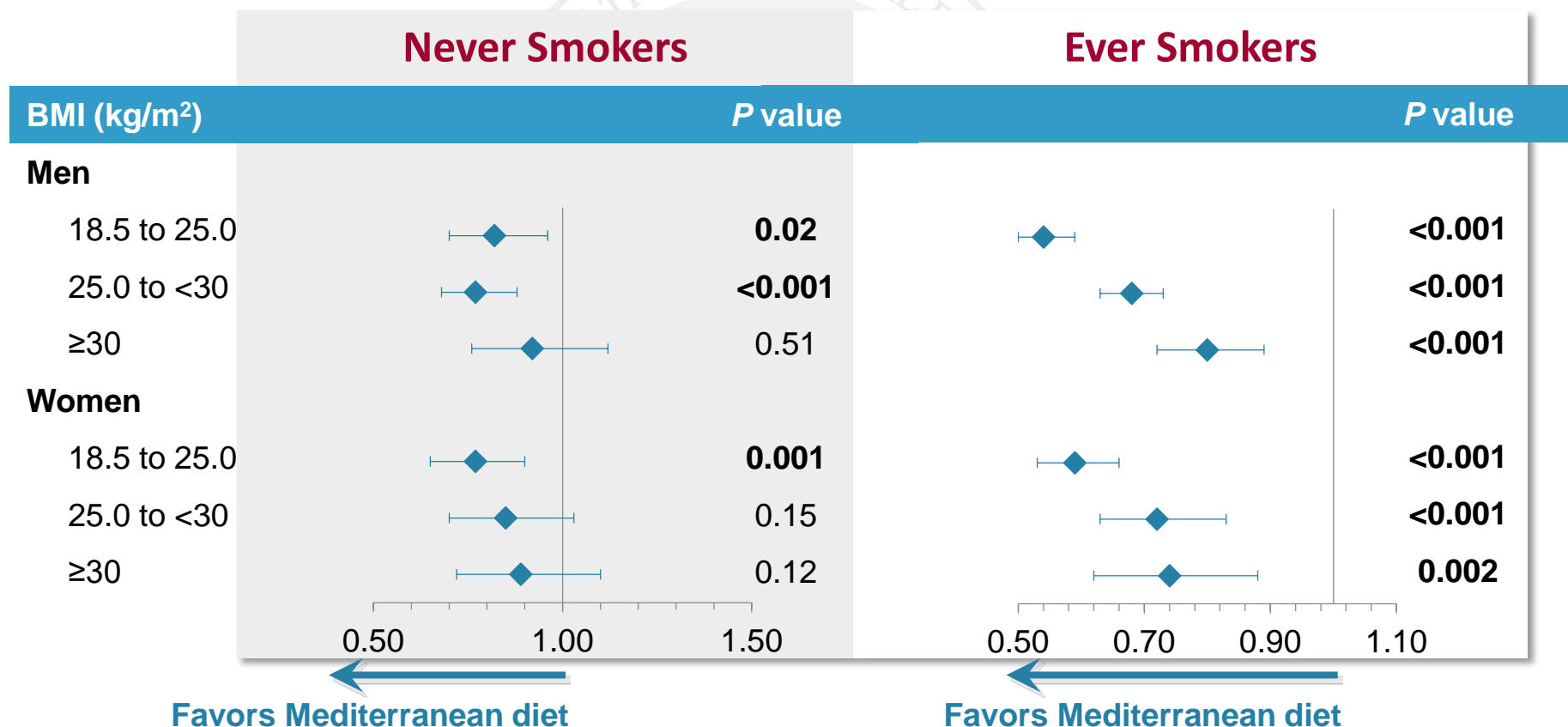
* $P < 0.001$ vs other diets.

FPG = fasting plasma glucose; HDL = high density lipoprotein; LDL = low density lipoprotein; T2D = type 2 diabetes.

Shai I, et al. *N Engl J Med.* 2008;359:229-241. Schwarzfuchs D, et al. *N Engl J Med.* 2012;367:1373-1374.

Effect of Mediterranean Diet Pattern on All-Cause Mortality

NIH-AARP Diet and Health Study
(n=214,284 men; n=166,012 women)



AARP = American Association of Retired Persons; BMI = body mass index; NIH = National Institutes of Health

Mitrou PN, et al. *Arch Intern Med.* 2007;167:2461-2468.



Lifestyle Intervention
Physical Activity

AACE Recommendations for Physical Activity

- Individualize recommendations according to patient goals and limitations
 - Activities/exercise within capabilities and preferences
 - Evaluate for contraindications and/or limitations to increased physical activity before beginning or intensifying an exercise program
 - Set realistic goals and schedules
- Encourage increased nonexercise physical and leisure activity
 - Taking stairs at work, weekend recreation
- Consider involvement of an exercise physiologist or certified fitness professional
 - To individualize physical activity prescription
 - To improve outcomes

AACE Recommendations for Aerobic and Resistance Training

Aerobic Training

- Goal ≥ 150 minutes/week*
- Greater moderate intensity (ie, “conversational”) physical activity (eg, brisk walking)
- Start slowly and build up gradually
- Additional 1-3% weight loss seen when higher intensity aerobic activity is added to a weight loss diet plan

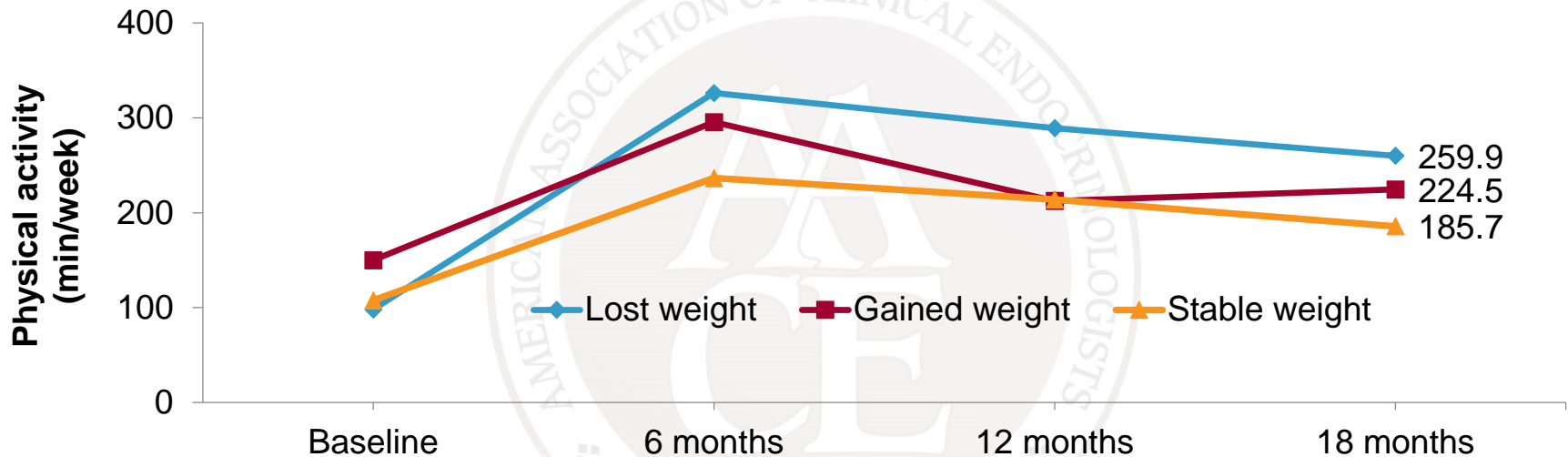
Resistance Training

- 2-3 sessions weekly* with major muscle groups
- Start slowly and build up gradually
- Results in improved body composition and metabolic risk factors
 - Greater fat loss and less fat-free mass loss

*Higher volume required for weight maintenance

How Much Physical Activity Is Enough?

Randomized, Controlled, Community Based Study (N=278 Overweight Adults*)



- Reduced calorie diet + physical activity required for weight loss in studies with obese patients
 - DPP (prediabetes): >150 min/week
 - Look AHEAD (T2D): >175 min/week

*BMI 25.0–29.9 kg/m². No reduction in energy intake.

BMI = body mass index; DPP = Diabetes Prevention Program; T2D = type 2 diabetes.

Jakicic JM, et al. *Obesity (Silver Spring)*. 2011;19:100–109. DPP Research Group. *N Engl J Med*. 2002;346:393-403. Look AHEAD Research Group. *Arch Intern Med*. 2010;170:1566-1575.

Advice for Physical Activity

Intensity

- At least moderate, physical activity (conversational—should be able to talk comfortably)
- Heart rate $\geq 70\%$ of maximum heart rate (max heart rate = $220 - \text{age}$)

Motivation

- Cross-train (ie, walk, ride, swim)
- Use a physical activity partner or professional trainer or attend organized programs
- Reward self

Frequency

- ≥ 3 -4 times/week
- Maintain a regular schedule with realistic goals)

Support

- Health care professional team must exude positive attitude regarding importance of physical activity

Advice for Physical Activity

- Hydrate
 - Drink fluids (>18 ounces) 1-2 hours before exercise
- Stretch
 - Include warm-up and cool-down periods of 5-10 minutes each
- Dress comfortably
 - Wear silica gel or air midsoles and polyester seamless socks
- Be safe
 - Check for blisters before and after activity
 - Patients with T2D, neuropathy, or vascular disease
 - Wear an ID bracelet if needed
- Have fun
 - Aerobic and resistance training are both beneficial
 - Be active with a friend

“But Doc, I Can’t Walk Too Far”

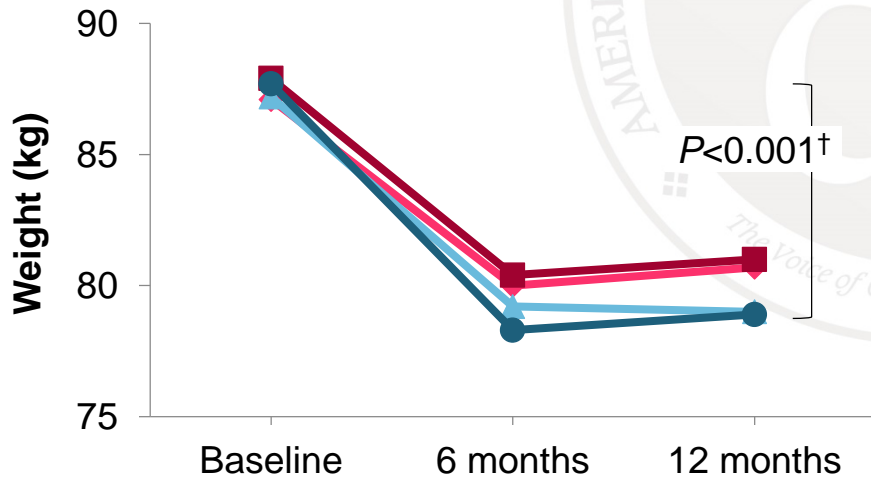
All patients	Low-impact activity: stationary bicycle, swimming, elliptical machine, stairstepper, treadmill, low-impact aerobics, weight-lifting machine
Foot disease, peripheral vascular disease, arthritis	Swimming, water aerobics, upper body resistance training
Orthostatic conditions	Semi-recumbent chair and weight lifting, semi-recumbent cycling, water exercise
Elderly	Stretching while sitting, elastic bands, movement exercise (eg, tai chi, hatha yoga)

Any activity is better than no activity!

Effect of Physical Activity Type and Participation on Weight Loss

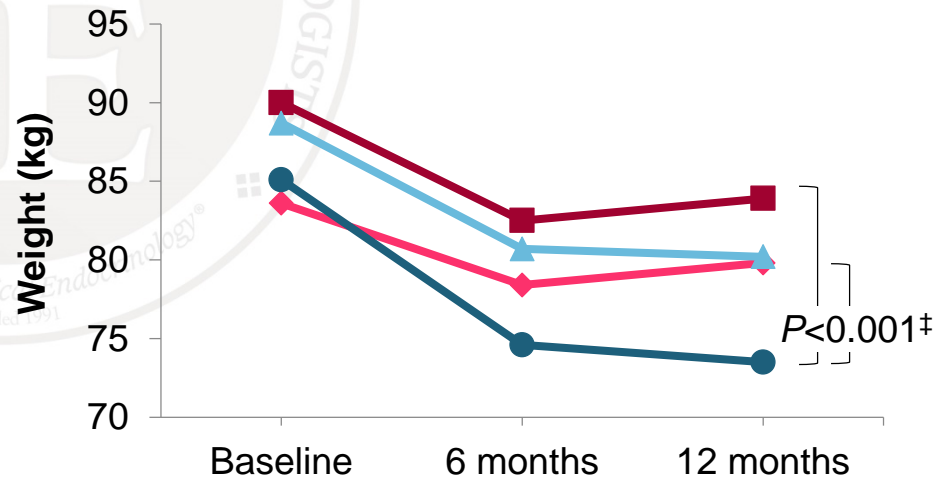
Type of Physical Activity

- ◆ Moderate intensity/moderate duration
- Vigorous intensity/moderate duration
- ▲ Moderate intensity/long duration
- Vigorous intensity/long duration



Level of Participation

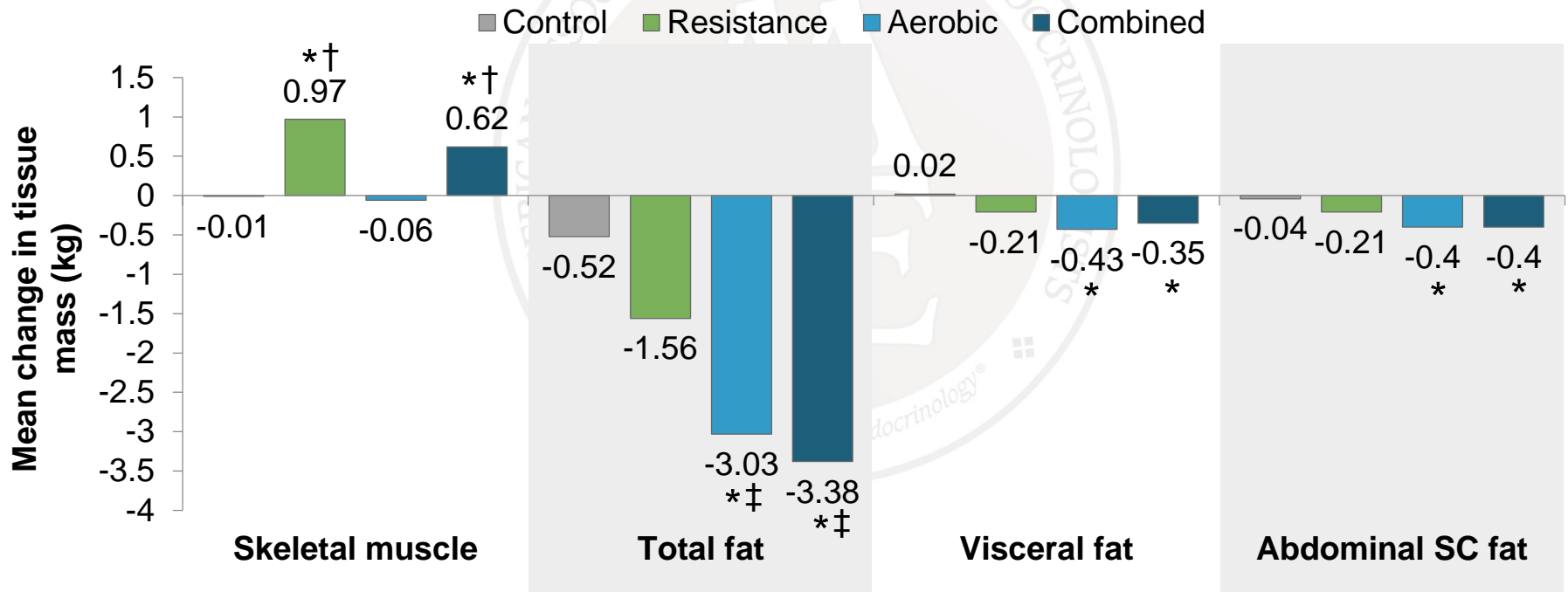
- ◆ <150 min/week at 6 and 12 months (n=31)
- Variable* (n=81)
- ▲ ≥150 min per week at 6 and 12 months (n=33)
- ≥200 min per week at 6 and 12 months (n=51)



*≥150 min/week at 6 months but <150 min/week at 12 months. [†]All groups vs baseline; no group differed significantly from the others at 6 or 12 months. [‡]Group with ≥200 min exercise vs variable groups and group with <150 min of exercise.

Effect of Exercise Type on Body Composition

MRI Measured Change in Fat and Muscle Mass (N=136 men and women with abdominal obesity)



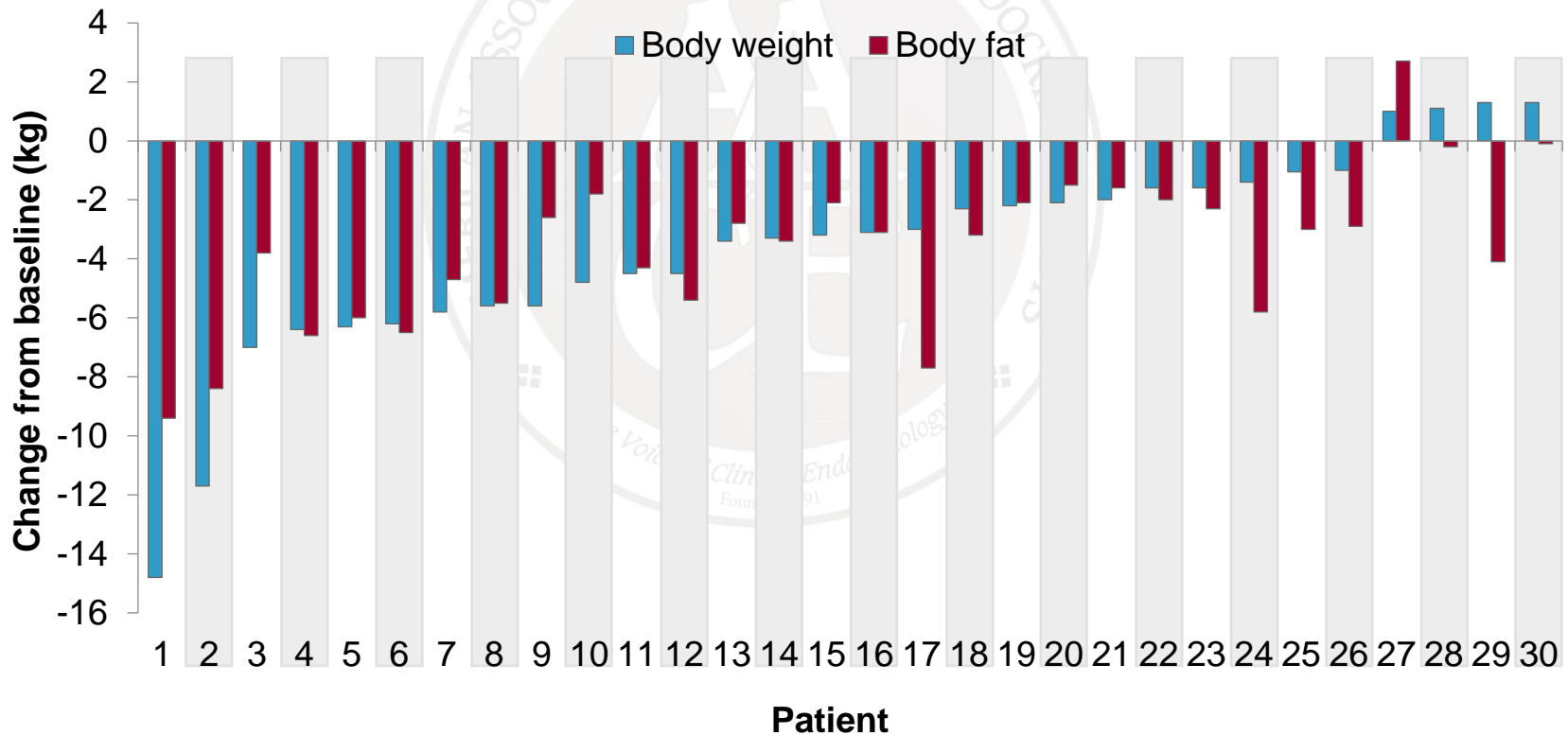
* $P < 0.05$ vs control. † $P < 0.05$ vs aerobic exercise. ‡ $P < 0.05$ vs resistance training.

SC = subcutaneous.

Davidson LE, et al. *Arch Intern Med.* 2009;169:122-131.

Individual Variability in Body and Fat Mass Changes

Individual Changes After 12 Weeks of Imposed Exercise
(N=30 overweight or obese men and women)





Lifestyle Intervention

Behavioral Interventions

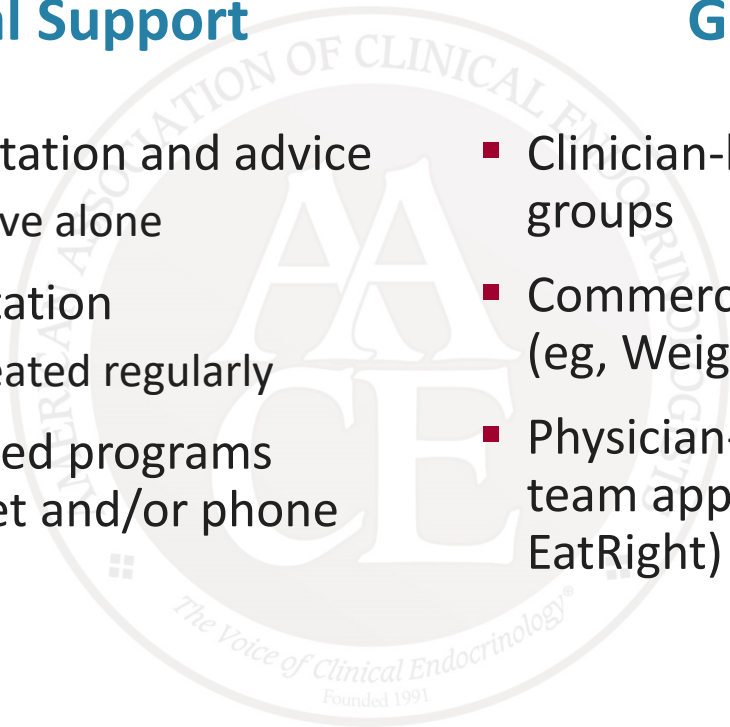
Lifestyle Intervention Support

Individual Support

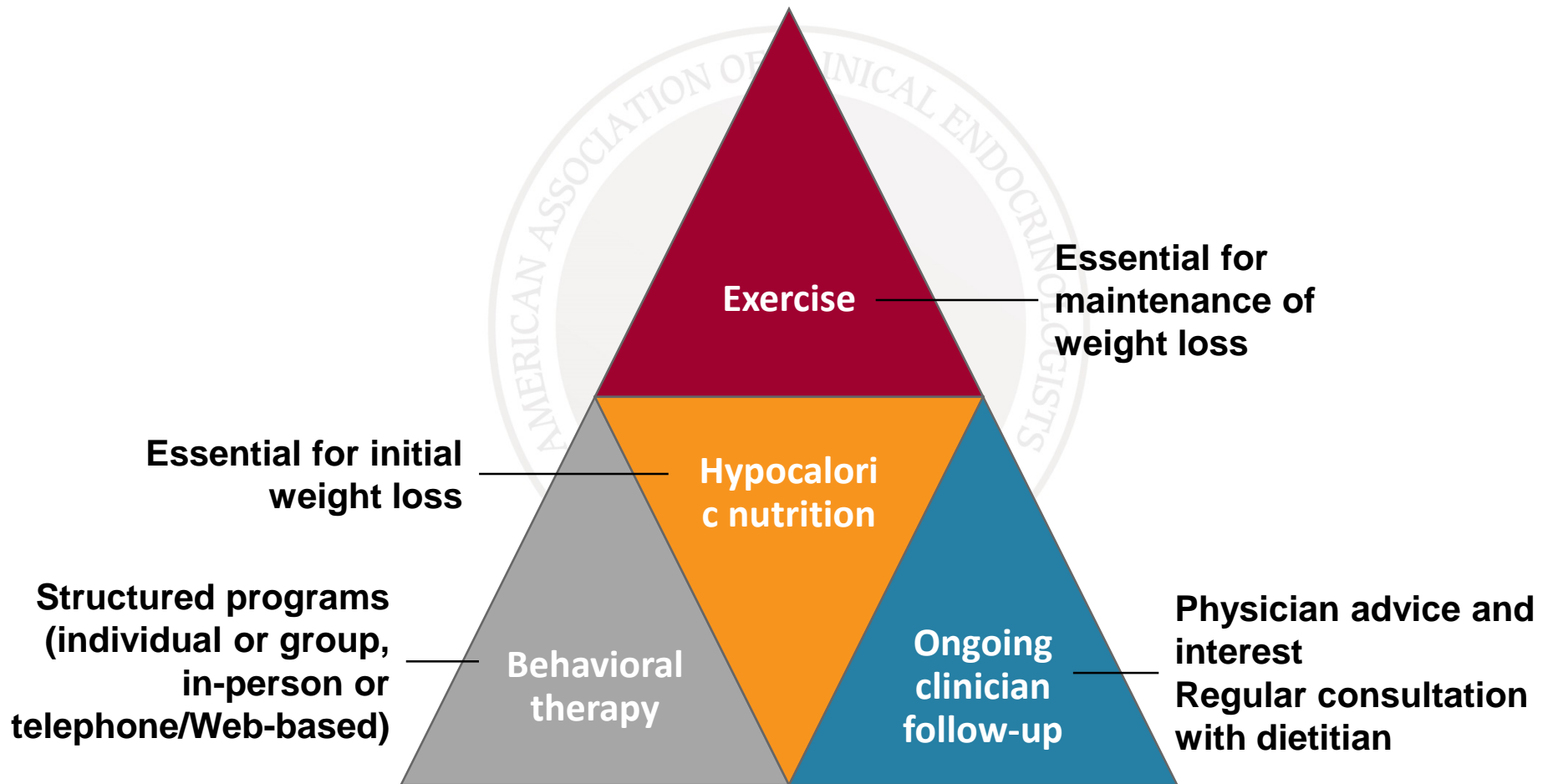
- Physician consultation and advice
 - Rarely effective alone
- Dietitian consultation
 - Must be repeated regularly
- Remote structured programs involving Internet and/or phone interactions

Group Support

- Clinician-led weight loss support groups
- Commercial structured programs (eg, Weight Watchers, Jenny Craig)
- Physician-driven multidisciplinary team approaches (eg, DPP, EatRight)



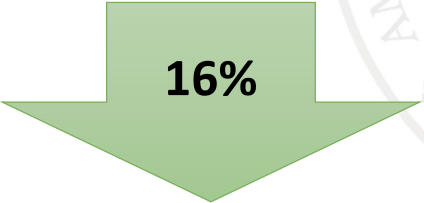
Lifestyle Interventions Are Most Successful When Supported



Intensive Lifestyle Interventions for Obesity

DPP Trial

- ILI instruction in diet, exercise, and behavior change in patients with prediabetes
 - First 6 months: ≥ 16 sessions
 - >6 months: at least every other month individually or in group
 - Low-fat diet: <25% of caloric intake; further calorie reduction if no weight loss

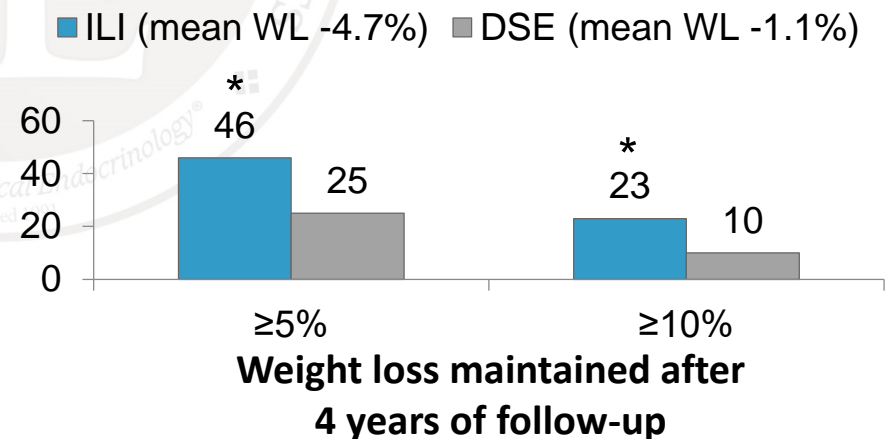


16%

Reduced risk of T2D with each kilogram of weight loss after 3.2 years of follow-up

Look AHEAD Trial

- DPP model ILI vs DSE in patients with T2D and CV risk
- Factors associated with weight loss maintenance
 - Weight loss at year 1
 - Attendance at more treatment sessions
 - Greater adherence to physical activity and energy intake recommendations

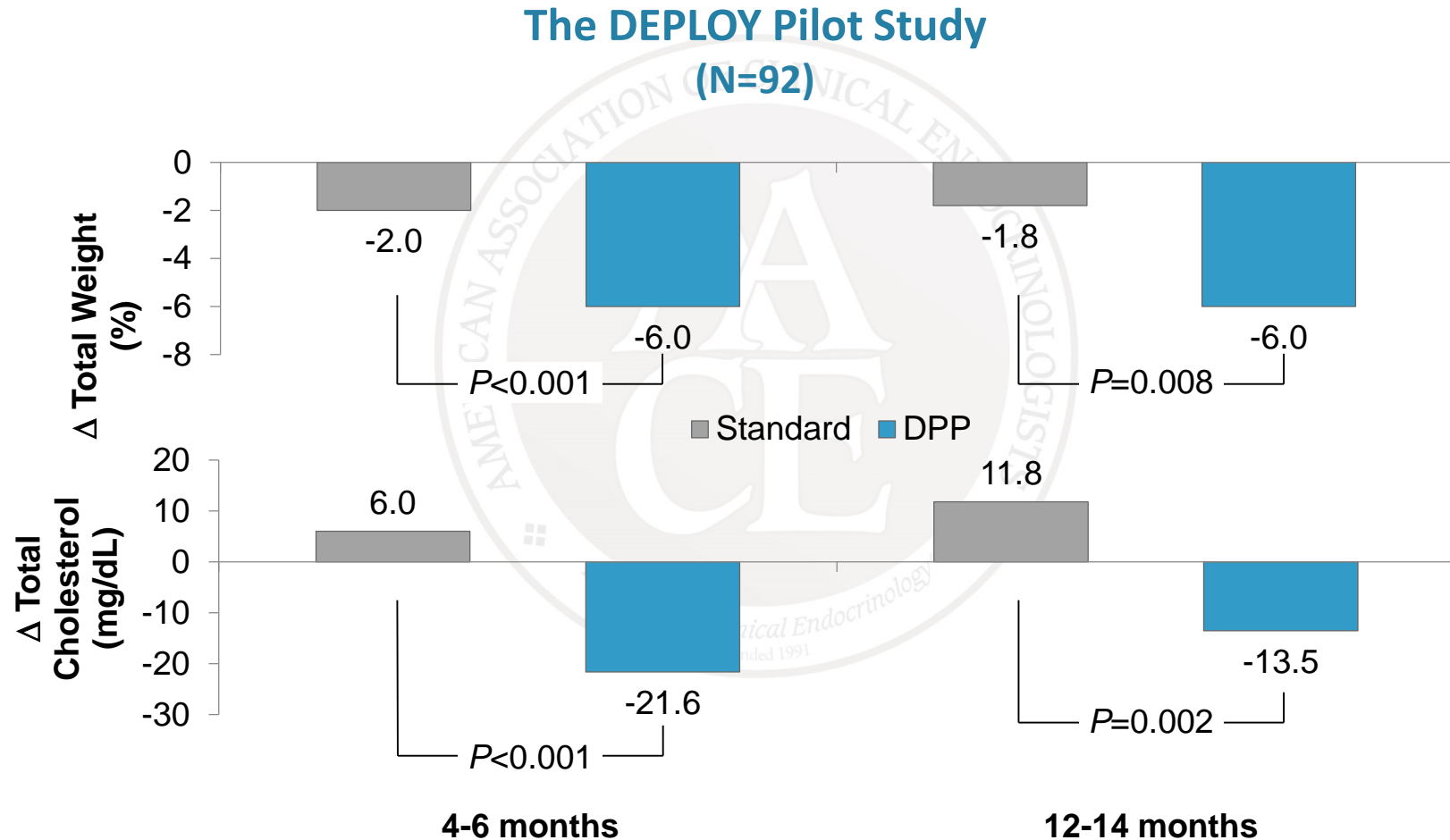


*P<0.0001 vs DSE.

CV = cardiovascular; DSE = diabetes support and education; ILI = intensive lifestyle intervention; T2D = type 2 diabetes.

Hamman RF, et al. *Diabetes Care*. 2006;29:2102-2107. Wadden TA, et al. *Obesity (Silver Spring)*. 2011;19(10):1987-1998.

DPP Model Community Intervention: Effect on Weight and Total Cholesterol

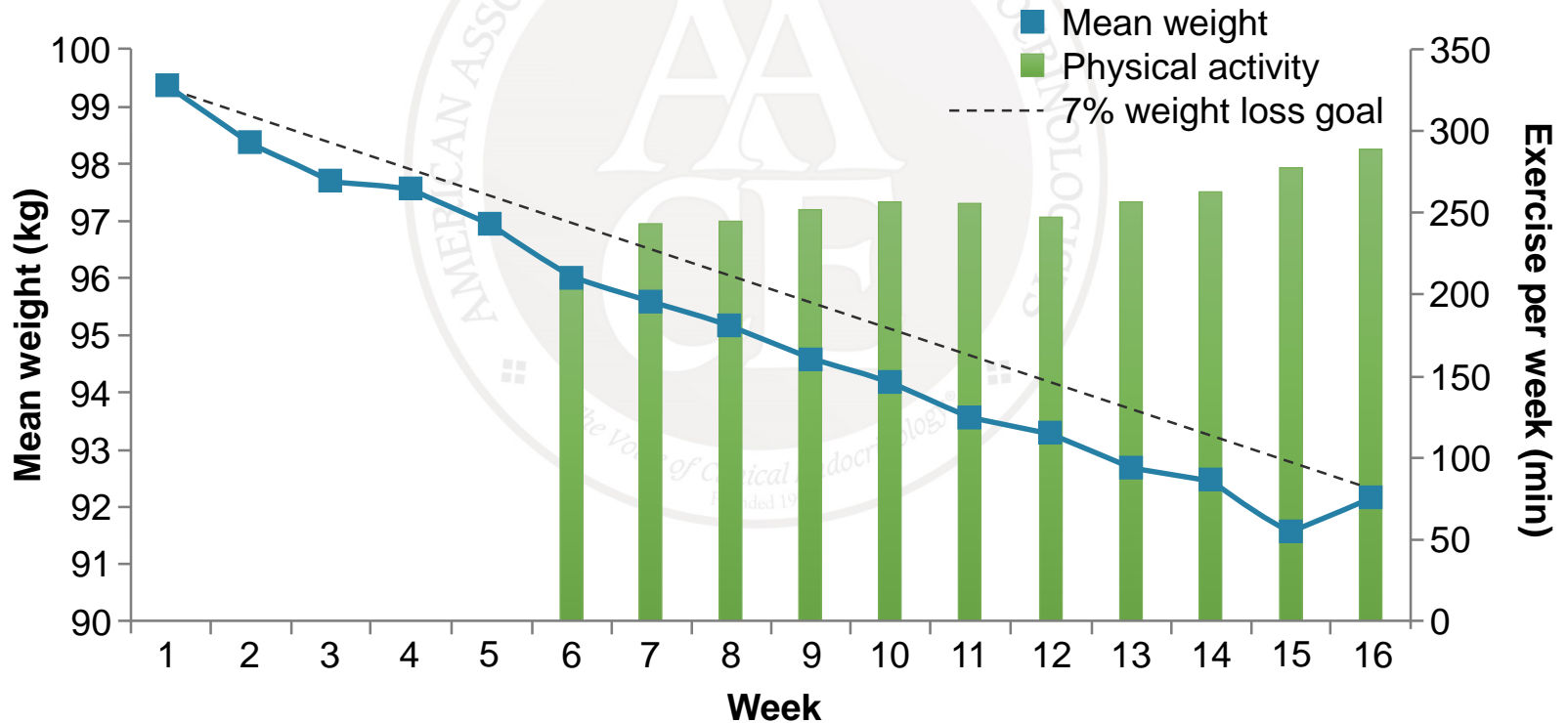


DEPLOY = Diabetes Education & Prevention with a Lifestyle Intervention Offered at the YMCA; DPP = Diabetes Prevention Program; YMCA = Young Men's Christian Association.

Ackermann RT, et al. *Am J Prev Med.* 2008;35:357-363.

DPP Model Community Interventions Foster Adherence

Montana Diabetes Control Program
16-session program based on DPP-style intervention
(N=355)

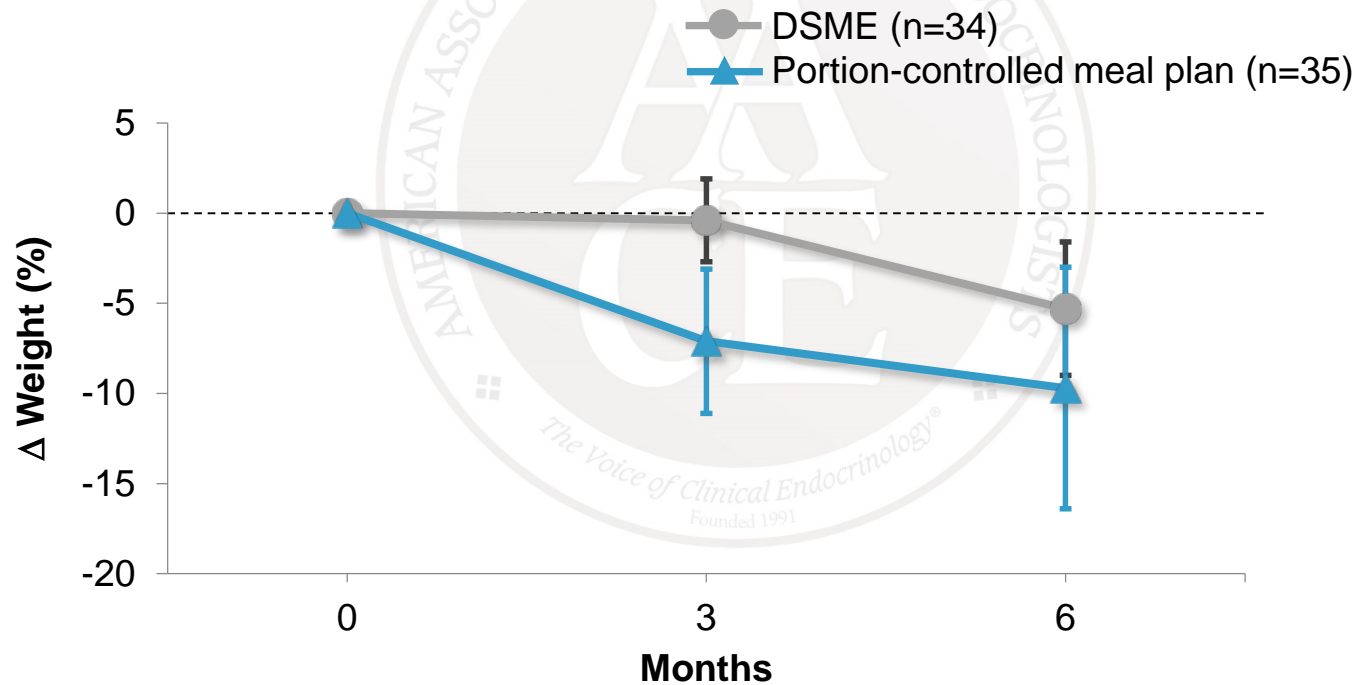


DPP = Diabetes Prevention Program.

Amundson HA, et al. *Diabetes Educ.* 2009;35:209-223.

Effect of Commercial Portion-Controlled Meal Plan

Nutrisystem Trial in Patients with Type 2 Diabetes (N=69)

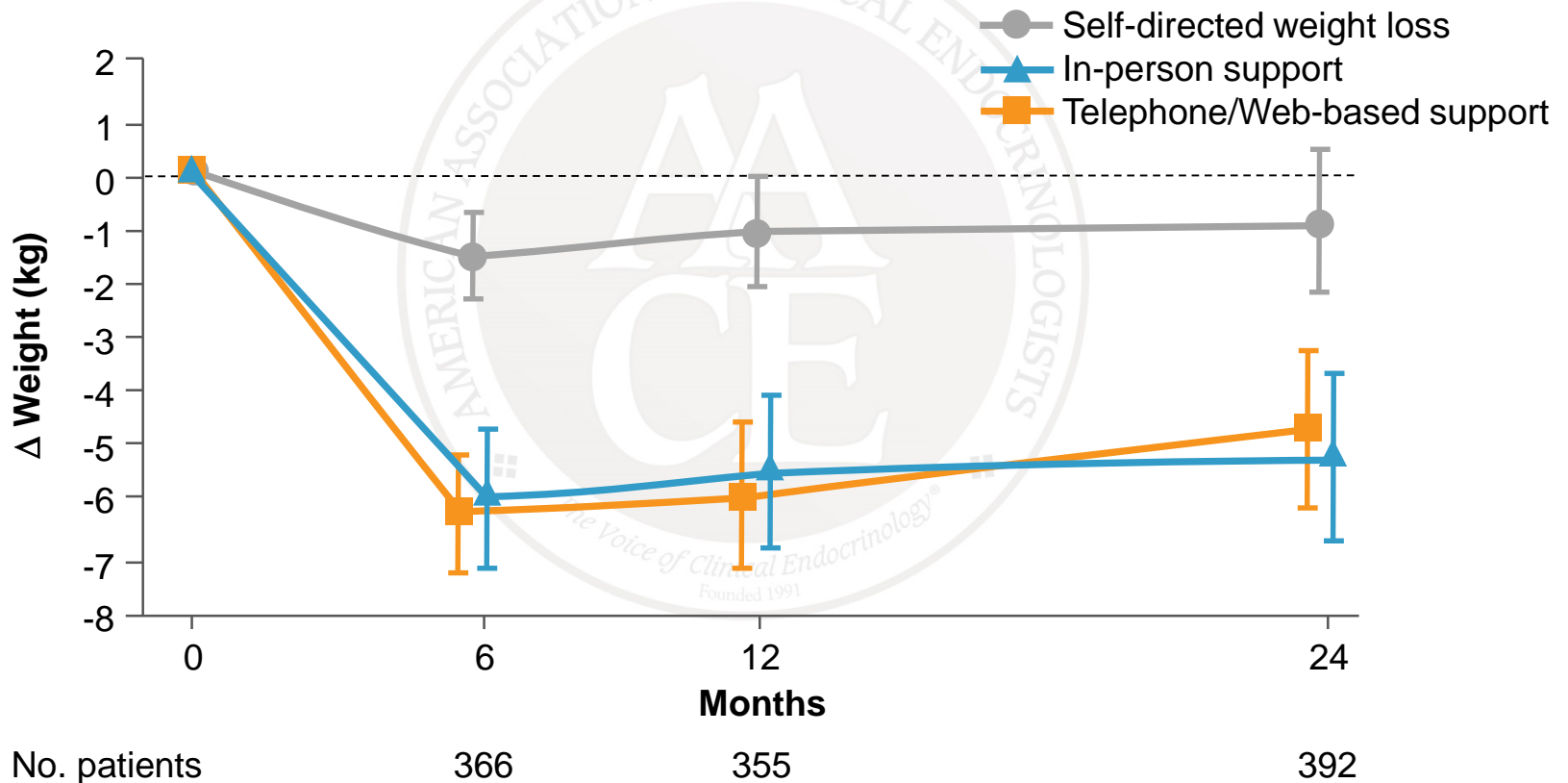


DSME = diabetes self-management and education support.

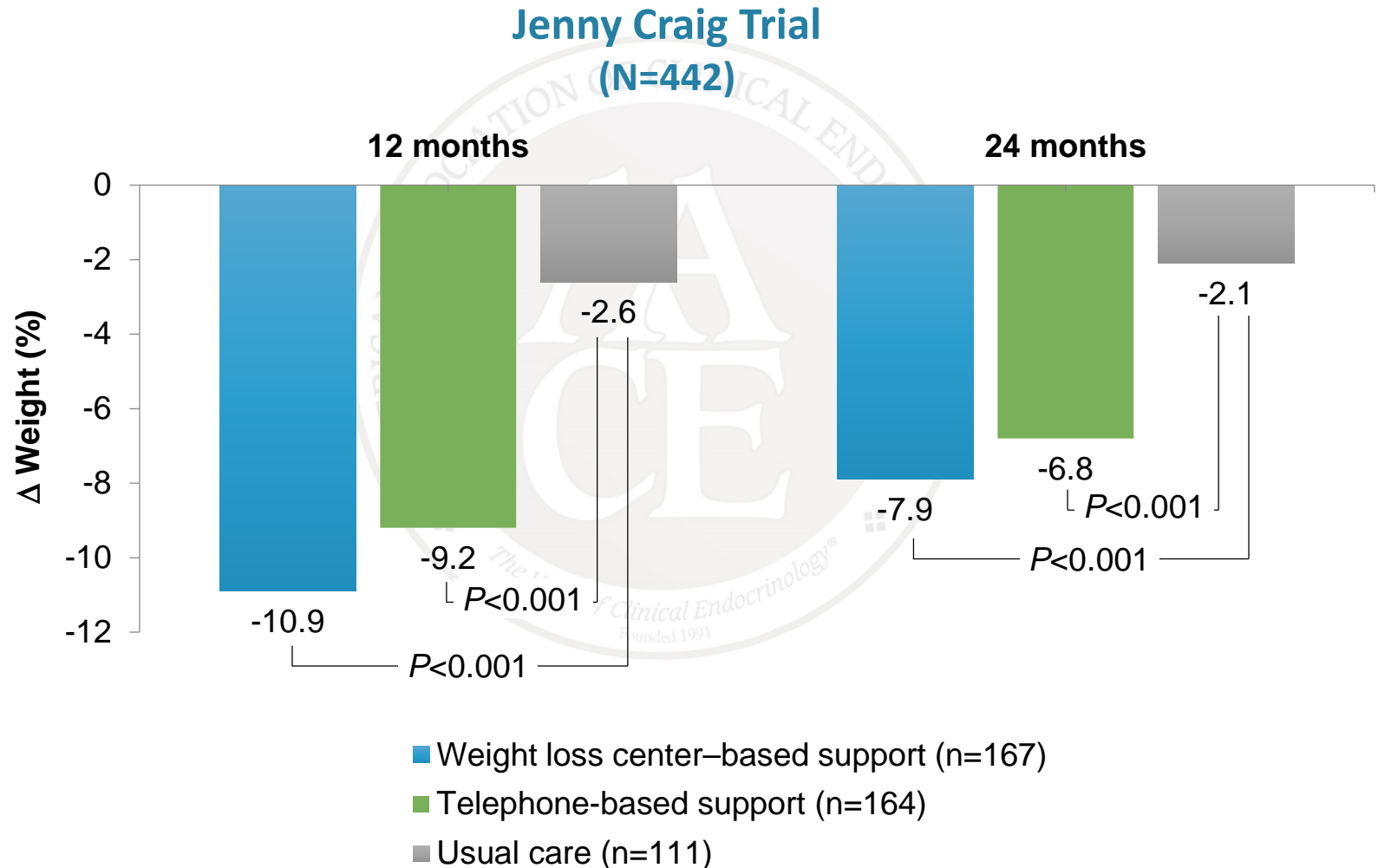
Foster GD, et al. *Postgrad Med.* 2009;121:113-118.

Benefits of Ongoing Behavioral Support

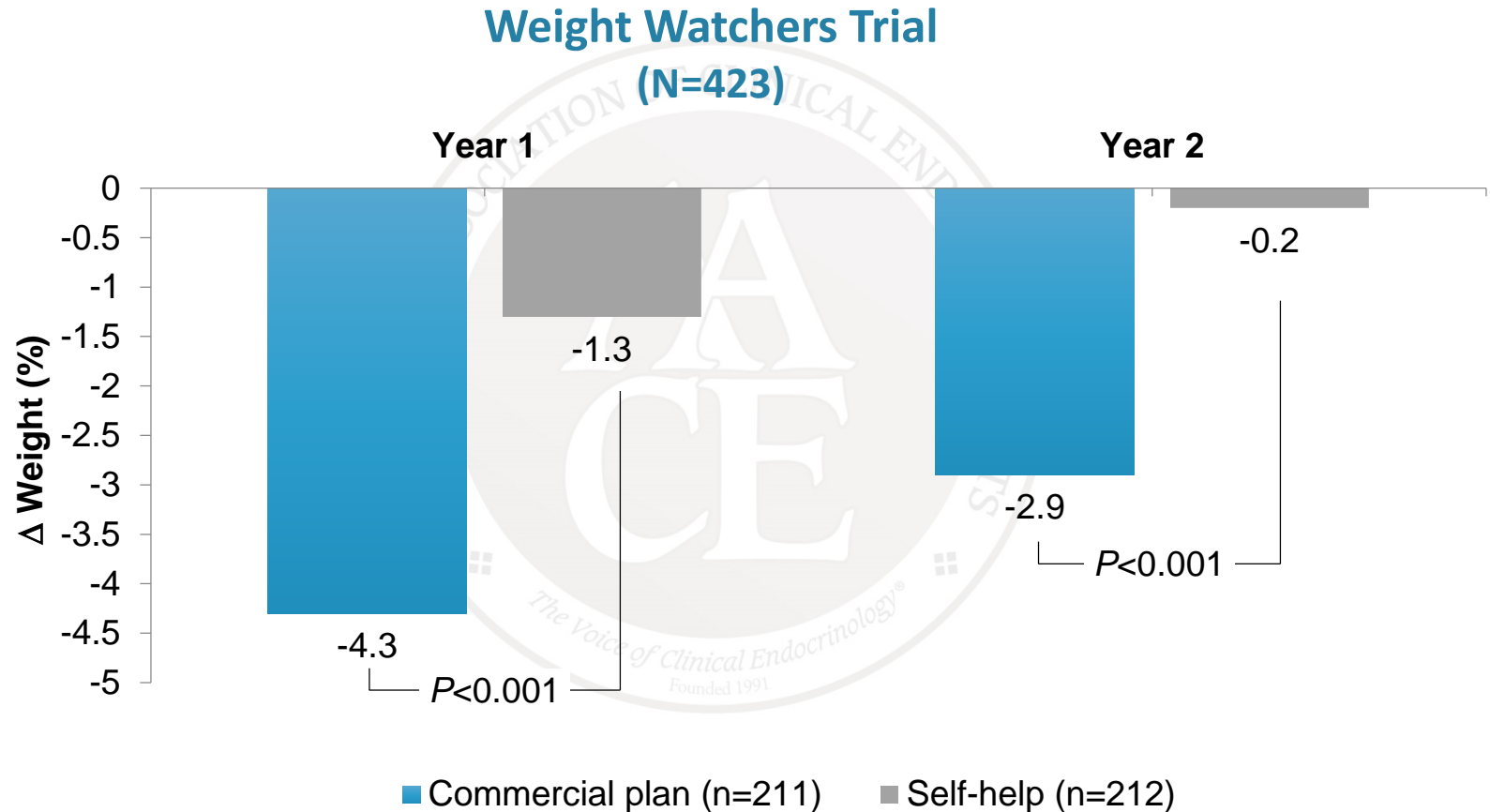
Practice Opportunities for Weight Reduction (POWER) Trial (N=415)



Effects of Commercial Meal Replacement Plan With Ongoing Support



Effects of Commercial Meal Replacement Plan With Ongoing Support





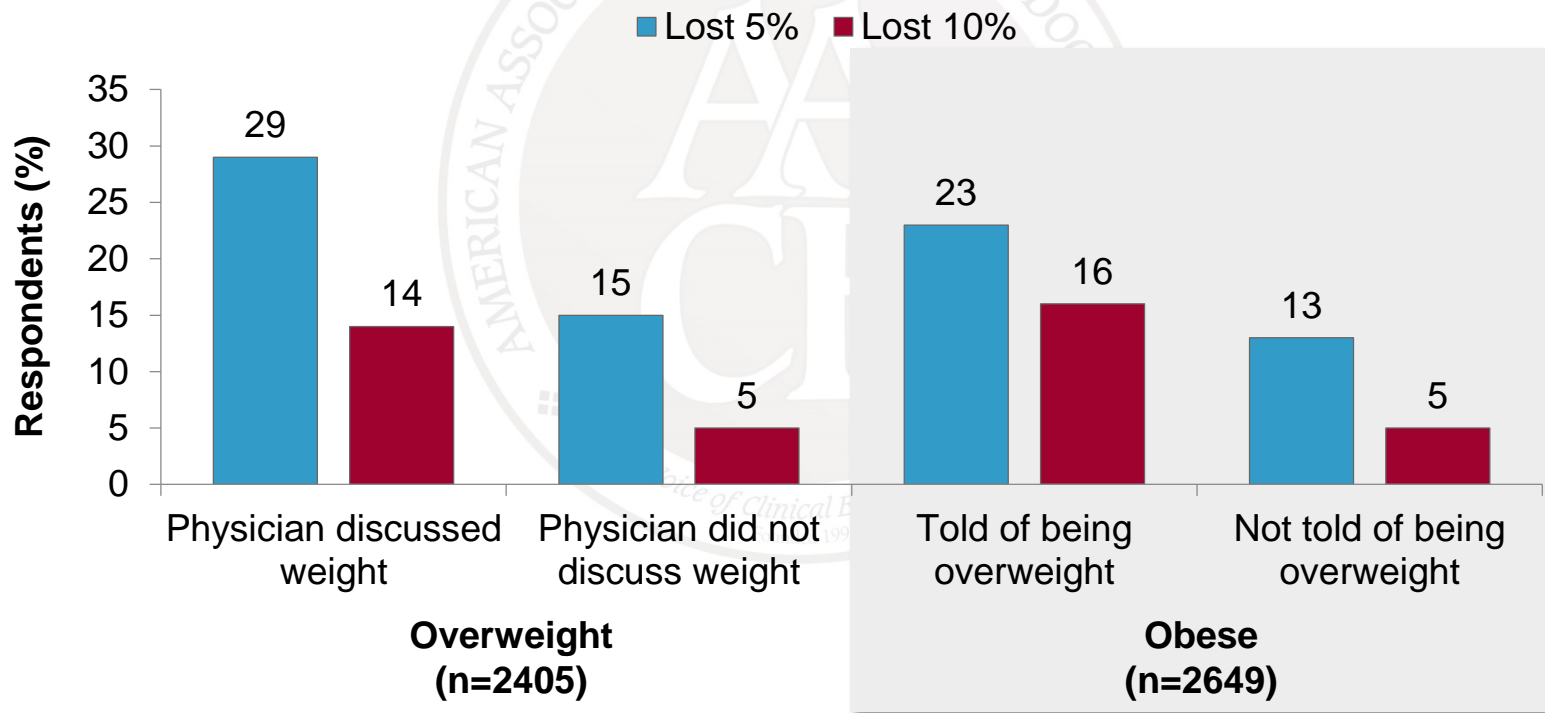
Lifestyle Intervention

Practical Approaches to Lifestyle Interventions for Clinicians

Physician Discussion of Weight Status and Self-Reported Weight Loss

2005-2008 NHANES

Respondents Reporting Weight Loss in Past Year



NHANES = National Health and Nutrition Examination Survey.

Pool AC, et al. *Obes Res Clin Pract.* 2014;8:e131-e139.

Set Realistic Goals With Your Patient

GOAL: decrease risk of complications and improve long-term health

Ask patient: What are your goals?

Patients often want to lose ~30% of body weight

A weight loss of “only” 7-10% may be deemed as “failure” by patients

Advise patients to accept steady, incremental progress and emphasize that improved health—not necessarily reduced weight—is the goal

- Short-term weight loss goal (for most patients): 7% to 10% loss at 6 months
 - Increase in muscle mass may be more important than decrease in fat mass
- Interim goal: weight maintenance
- Long-term goal (if desired): additional energy deficit recalculated for the next weight loss goal

Remind patients that reducing caloric intake and increasing physical activity are key to achieving and maintaining weight

Lifestyle Therapy for Obesity: Features of Behavior Modification

- Office motivational interviewing
 - Goal setting
 - Self-monitoring
 - Mobilization of social support systems
- Psychological counseling as needed
 - Problem solving strategies
 - Stimulus control
 - Stress reduction
- Ongoing education and monitoring
 - Face-to-face, group sessions, technologies

Motivational Interviewing

Definition

- A guiding style of communication that helps
 - Engage patients in self-care
 - Clarify their strengths and aspirations
 - Evokes their own motivations for change
 - Promotes autonomy of decision making

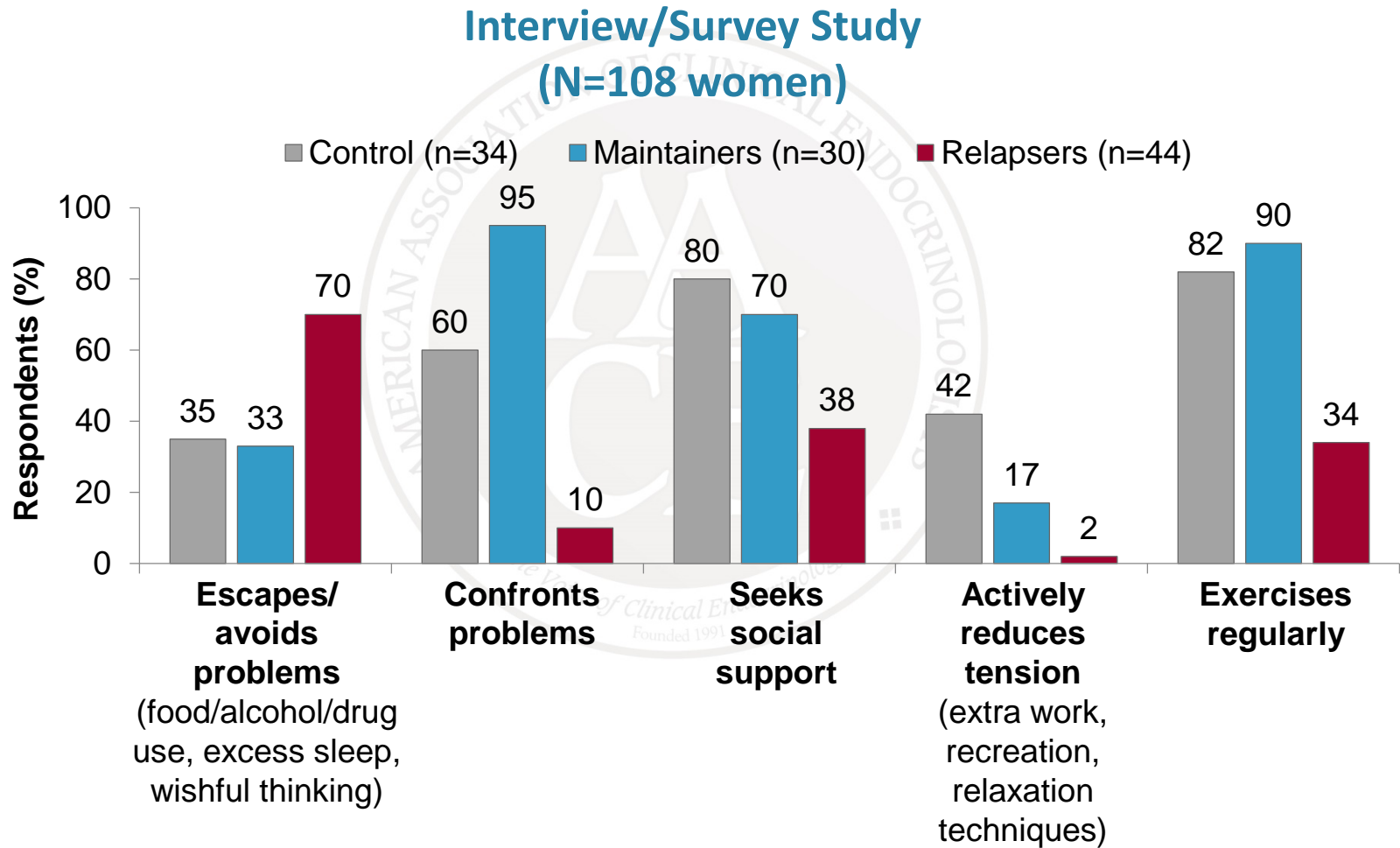
Technique

- Ask
 - Use open-ended questions to invite the patient to consider how and why they might change
- Listen
 - Understand the patient's experience
 - Summarize with reflective listening
- Inform
 - Ask permission to provide information
 - Ask what the implications might be for the patient

Early Weight Loss Supports Long-Term Success

- Weight loss of $>2.5\%$ in the first month of the DPP predicted long-term weight loss success
- Stepped care approach involves education on problem solving skills and evaluation of outcomes
 - Intensify behavioral lifestyle intervention if patients do not achieve a 2.5% weight loss in the first month
 - Intervention and support should be tailored to each patient's ethnic, cultural, and educational background

Importance of Behavior Modification Support for Weight Loss Maintenance



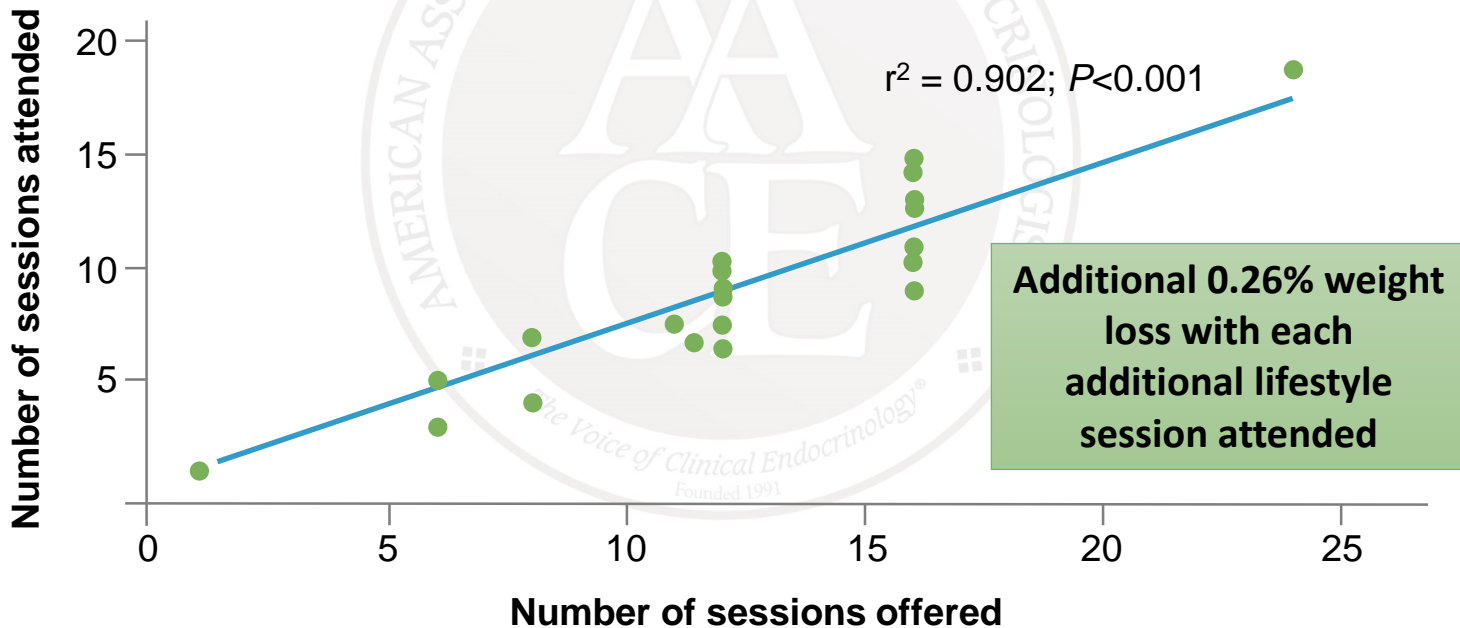
Control = always at normal weight; maintainers = formerly >20% overweight but now normal weight; relapsers = currently >20% overweight and had previously lost and regained \geq 20% of body weight.

Monitor Weight and Reinforce Weight Loss Goals During Follow-up Visits

- Monitor and discuss weight status at each visit—open communication is vital
- Encourage self-monitoring of healthy eating and regular physical activity
- Remind patient of health benefits of maintaining a healthy weight
- Reinforce realistic short and long-term expectations
- Encourage continued adherence to healthy lifestyle and behavioral changes

Lifestyle Therapy in a Real World Setting: Number of Sessions and Weight Loss

Systematic Review and Meta-analysis*
(N=28 studies of DPP translational model)



*Spearman Rank Correlation Test result. Blue line = best fit through the plot.

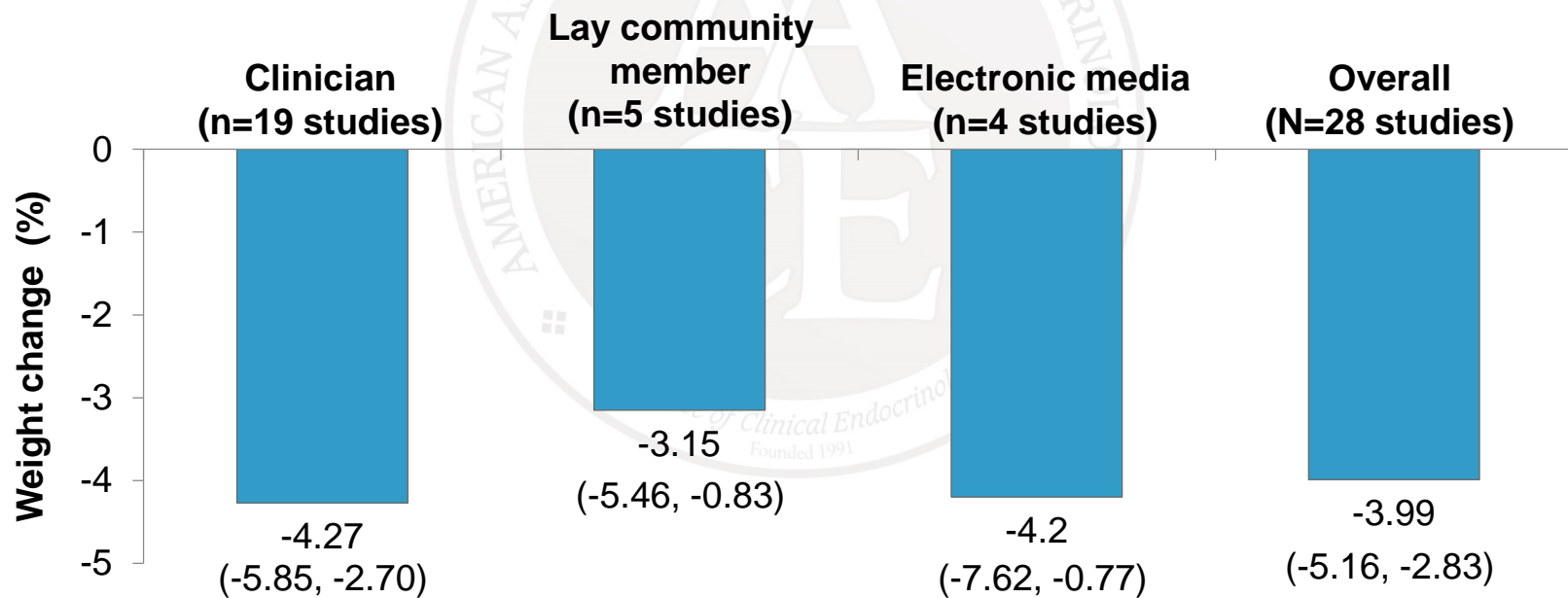
DPP = Diabetes Prevention Program.

Ali MK, et al. *Health Aff (Millwood)*. 2012;31:67-75.

Effectiveness of Professional, Lay, and Online Counseling for Weight Loss

Systematic Review and Meta-analysis
(N=28 studies of DPP translational model)

Average Weight Loss by Program Leader/Type*



*Pooled estimates of percentage weight change for each category of delivery personnel (95% confidence interval).

DPP = Diabetes Prevention Program.

Ali MK, et al. *Health Aff (Millwood)*. 2012;31:67-75.

Recommended Components of Success

- A healthy, reduced calorie meal plan
 - Dietitian visits
 - Structured diets
 - Commercial programs and replacement meals
- Aerobic and resistance exercise
 - Trainer, health coach, sports medicine
- Behavior change interventions
 - Face-to-face office meetings
 - Group sessions
 - Remote technologies (telephone, internet, text messaging)

Lifestyle Therapy Summary

- Lifestyle interventions effectively prevent physical and metabolic complications of obesity
 - Lifestyle alone is less effective in populations with higher stages of obesity
- Weight loss with lifestyle change is difficult to maintain
 - Behavioral support may need to be intensified to assist with weight loss and maintenance
 - Initial weight loss benefits are sustained even with weight regain
- Support groups
 - Health care professional teams and community groups should help patients set realistic goals and encourage adherence to healthy weight loss/maintenance behaviors