Popular Weight Loss Diets: Mythology, Evidence, and Your Practice

Penny M. Kris-Etherton PhD RD FAHA FNLA FASN CLS
Department of Nutritional Sciences
Penn State University

Disclosures

<table>
<thead>
<tr>
<th>AFFILIATION/FINANCIAL INTERESTS (past 12 months)</th>
<th>CORPORATE ORGANIZATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grants/Research Support:</td>
<td>CA Walnut Commission, Almond Board of CA, Hershey Foods, Dupont, Canola Oil Council</td>
</tr>
<tr>
<td>Scientific Advisory Board/Consultant:</td>
<td>Unilever, CA Walnut Commission, McDonald's, Avocado Nutrition Sciences Advisors</td>
</tr>
</tbody>
</table>
Outline

• Prevalence of overweight/obesity in the U.S.

• 2013 AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults

• Popular weight loss diets

• Evidence-based weight loss strategies

• Importance of nutrient adequacy

• Summary

Prevalence of Overweight/Obesity - Adults (2011-2012)

- 35% are obese
- 69% are overweight or obese

Source: Health, United States, 2014 (http://www.cdc.gov/nchs/fastats/obesity-overweight.htm)
Prevalence of Obesity Among U.S. Adults Aged 20-74

Derived from NHANES data

Age-adjusted prevalence of obesity in adults 20 to 74 years of age by sex and survey year


Moraffarian D et al. Circulation. 2015;131:e29–e32
Copyright © American Heart Association, Inc. All rights reserved.
Racial Disparities in Obesity (2009–2012)

NOTES: = 95% confidence interval. Data are for the proportion of adults 20 years and over who are obese, defined as a BMI ≥ 30.0 kg/m². BMI is calculated based on measured height and weight. Data are age adjusted to the 2000 standard population. Respondents were asked to select one or more races. The categories black and white include persons who reported only one racial group and exclude persons of Hispanic origin. Persons of Hispanic origin may be of any race.
SOURCE: National Health and Nutrition Examination Survey (NHANES), CDC/NCHS.

2013 AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults

Endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation, American Pharmacists Association, American Society for Nutrition, American Society for Parenteral and Enteral Nutrition, American Society for Preventive Cardiology, American Society of Hypertension, Association of Black Cardiologists, National Lipid Association, Preventive Cardiovascular Nurses Association, The Endocrine Society, and WomenHeart: The National Coalition for Women with Heart Disease

**Recommendation 3a**

Prescribe a diet to achieve reduced calorie intake for obese or overweight individuals who would benefit from weight loss, as part of a comprehensive lifestyle intervention. Any one of the following methods can be used to reduce food and calorie intake:

- Prescribe 1,200–1,500 kcal/d for women and 1,500–1,800 kcal/d for men (kilocalorie levels are usually adjusted for the individual’s body weight);
- Prescribe a 500- to 750-kcal/d energy deficit; or
- Prescribe one of the evidence-based diets that restrict certain food types (such as high-carbohydrate foods, low-fiber foods, or high-fat foods) in order to create an energy deficit by reduced food intake.


---

**Recommendation 3b**

Prescribe a calorie-restricted diet for obese and overweight individuals who would benefit from weight loss, based on the patient's preferences and health status, and preferably refer to a nutrition professional* for counseling. A variety of dietary approaches can produce weight loss in overweight and obese adults, as presented in CQ3, ES2.

Prevalence of Dieting to Lose Weight Between 1950 and 2010 in the U.S.

<table>
<thead>
<tr>
<th>Survey period</th>
<th>Women (%)</th>
<th>Men (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950–1966</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Late 1980s</td>
<td>40</td>
<td>25</td>
</tr>
<tr>
<td>Mid-1990s</td>
<td>44</td>
<td>29</td>
</tr>
<tr>
<td>2001–2002</td>
<td>48</td>
<td>34</td>
</tr>
<tr>
<td>2003–2008</td>
<td>57</td>
<td>40</td>
</tr>
</tbody>
</table>


Four out of Five Americans are Trying to Lose Weight or Maintain Their Current Weight

- I am trying to lose weight: 52% (2015), 54% (2014), 56% (2013)
- I am trying to maintain my weight: 29% (2015), 25% (2014), 27% (2013)
- I am trying to gain weight: 3% (2015), 3% (2014), 3% (2013)
- I am currently not doing anything regarding my weight: 16% (2015), 18% (2014), 15% (2013)

International Food Information Council Foundation
Food and Health Survey 2015

2015 n=1,007; 2014 n=1,005; 2013 n=1,006
Arrows indicate significant (p<.05 level) differences vs. prior years
Top Contributors to Weight Loss/Weight Maintenance

Which of the following would contribute/has contributed the most to your success in maintaining/losing weight? (Select up to 4 options.)

- Changing the types of food eaten: 51%
- Making sure I get enough physical activity: 50%
- Eating smaller meals or snacks: 41%
- Controlling higher calorie food and beverages: 30%
- Changing how often I eat throughout the day: 24%
- Weighing myself on a regular basis: 22%
- Keeping track of calories: 16%
- Support of family/friends: 11%
- Having a workout buddy: 10%
- Using a digital tracker: 6%
- Participating in a weight loss program: 6%
- Working with a personal trainer: 5%
- Working with a health professional: 5%
- Workplace wellness programs/incentives: 5%
- None of the above: 10%

International Food Information Council Foundation
Feed and Health Survey 2015
N = 1,007

Diet Mythology - Smoke and Mirrors

Dr. Oz Green Coffee Bean Study Retracted: Latest Weight Loss Miracle Gets Debunked.

Dr. Oz Grilled In Congress, Admits Weight Loss Products He Touts Don't Pass 'Scientific Muster'
1. Weight Watchers
2. HMR (Health Management Resources) Diet
3. Biggest Loser Diet
3. Jenny Craig
3. Raw Food Diet
6. Volumetrics (Low Energy Density)


Top-Searched Diets

<table>
<thead>
<tr>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Dukan Diet</td>
<td>1 Michael Phelps diet</td>
<td>1 Paleo Diet</td>
</tr>
<tr>
<td>2 Four Hour Diet</td>
<td>2 Beyond diet</td>
<td>2 Juice Cleanse Diet</td>
</tr>
<tr>
<td>3 17 Day Diet</td>
<td>3 Raspberry Ketone diet</td>
<td>3 Mediterranean Diet</td>
</tr>
<tr>
<td>4 Slow Carb Diet</td>
<td>4 Pink Method diet</td>
<td>4 Master Cleanse Diet</td>
</tr>
<tr>
<td>5 Perfect Health Diet</td>
<td>5 Adriana Lima diet</td>
<td>5 Ketogenic Diet</td>
</tr>
</tbody>
</table>

*The three charts above depict annual Top 5 Diet searches in the US with the largest increase in search volume via Google Trends. Source: http://www.foodinsight.org/Top_Googled_Diets_Do_They_Live_Up_to_the_Hype/#sthash.iZSeSxp4.dpuf
Popular Weight Loss Diets: Low Carbohydrate

- **Paleo Diet Claim:** By following the eating habits of our hunter-gatherer ancestors, it is possible to lose 5 to 10 lbs in the first week and reduce risk of modern diseases.
- **Avoid:** dairy, potatoes, grains (i.e. wheat), and legumes
- **Allow:** any food consumed by our caveman ancestors (i.e. all meats, seafood, eggs, fruits, nuts, and vegetables).
- **Summary:** it is a diet slightly higher in protein and fat, but significantly lower in carbohydrates than currently recommended
- **Pros:** encourages increased fruit and vegetable consumption, high in potassium, fiber, vitamin B12.
- **Cons:** increased grocery bills, trouble with diet adherence, and risk of nutrient deficiencies. **Low in vitamin D and calcium** - supplement recommended.

Popular Weight Loss Diets: High Protein

- **Dukan Diet Claim:** This high-protein, 4-phase diet promotes a **10-pound weight loss in the first ten days** by eating as much as you want of 100 approved foods.
- **“Attack Phase”** (between 2-7 days): includes a restrictive list of 68 high-protein foods
- **“Cruise Phase”** (about 3 days per pound): the addition of 32 approved vegetables.
- **Other food groups such as grains and cheese are gradually added in during the final phases, with the intention of achieving final weight stabilization.**
- **Pros:** Because nonfat dairy is emphasized, calcium needs are met; filling
- **Cons:** The highly restrictive nature of the Attack and Cruise phases raise health concerns that make it difficult to recommend, **does not meet recommendations for:** fiber, potassium, vitamin D. **Also high in sodium.**
Popular Weight Loss Diets: Juice Cleanse or “Detox” Diets

- **Claim:** Promotes 5 lb weight loss in 5 days.
- Some plans involve drinking nothing but liquids, while others include some food as a snack or meal.
- **Master Cleanse (Lemonade) Diet:** For at least 10 days you are limited to 4 cups of salt water each morning, a cup of herbal laxative tea at night, and 6 to 12 glasses throughout the day of the “lemonade”—a concoction you make from fresh lemon or lime juice, maple syrup, cayenne pepper, and water.
- **Pitfalls:**
  - Not nutritionally adequate
  - Side effects include headache, fatigue, moodiness
  - No scientific basis

Popular Weight Loss Diets: Balanced

- **17 Day Diet:** The diet is divided into three 17-day cycles to prevent boredom and your body from plateauling
  - Accelerate (first cycle): calories are cut back to about 1,200 per day, sugar intake is reduced, and focus is on improving digestion.
  - Activate (second cycle): alternate between Accelerate’s limited-calorie diet and Activate’s slightly higher-calorie meal plan to reset metabolism and stimulate fat burning
  - Achieve (third cycle): focus is on developing good eating habits to lose another 2 to 3 pounds.
  - Arrive (final cycle): maintain your goal weight by eating healthfully on weekdays and enjoying your favorite foods (in moderation) on the weekends.
- **Pros:** Well balanced, nutritionally sound
- **Cons:** Due to low calorie intake may fall short of several nutrients.
Popular Weight Loss Diets: Another Quick Fix

- The diet is a combination of low calorie, chemically compatible foods designed to help you lose 10 pounds in one week. And because the diet is 3 days on and 4 days off, the Military Diet doesn’t slow down your metabolism like other diets.

How it works:
- Low in calories (1000-1500 kcal/day)
- Intermittent fasting to avoid lowering your metabolism
- Specific foods designed to “kick up metabolism”: caffeine, grapefruit, dairy (calcium), lean protein and apples

Day 1 Sample Menu
Breakfast:
1/2 Grapefruit
1 Slice of Toast
2 Tablespoons of Peanut Butter
1 cup Coffee or Tea (with caffeine)
Lunch:
1/2 Cup of Tuna
1 Slice of Toast
1 cup Coffee or Tea (with caffeine)
Dinner:
3 ounces of any type of meat
1 cup of green beans
1/2 banana
1 small apple
1 cup of vanilla ice cream

Micronutrient Inadequacy of Popular Weight Loss Diets

- Three days of suggested daily menus from popular weight loss diets were evaluated for 27 essential micronutrients.
- The diets were: Atkins for Life diet, The Best Life Diet, and The South Beach Diet.
- All diet plans did not meet 100% of the RDIs for 27 essential micronutrients.
- Six micronutrients were consistently low in all diets: biotin, vitamin D, vitamin E, chromium, iodine, and molybdenum.

http://themilitarydiet.com/

At the Recommended Calories, what Percentage of the RDI for Each of 27 Essential Micronutrients is Met?

<table>
<thead>
<tr>
<th>Diet Plan</th>
<th>Recommended Calories</th>
<th>% of Nutrients that meet 100% of RDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Beach</td>
<td>1197</td>
<td>22</td>
</tr>
<tr>
<td>Atkins</td>
<td>1786</td>
<td>44</td>
</tr>
<tr>
<td>Best Life</td>
<td>1793</td>
<td>56</td>
</tr>
</tbody>
</table>

Criteria of Healthy Weight Loss Diets

- It is safe, and provides all DRIs for micronutrients and macronutrients.
- It does not advise less than 1,200 calories per day.
- Slow, steady weight loss is recommended, ≈1-2 lbs/week.
- There are no forbidden, or “bad” foods.
- Hunger is minimized.
- Weight maintenance guidelines & a follow-up program are provided.
- Balanced food choices from all food groups are emphasized, as well as sensible portion sizes and physical activity.
- Specially formulated foods or vitamin supplements are not promoted.
- Information about membership costs and weekly fees are provided.
- Establishing lifelong healthy habits is emphasized.
- The program fits into one’s lifestyle.

http://www.ext.colostate.edu/pubs/foodnut/09363.html
Successful Long-Term Weight Loss Maintenance Strategies - the National Weight Control Registry*

- Engage in high levels of physical activity
- Eat a low calorie, low fat diet
- Eat breakfast daily
- Self-monitor weight
- Maintain a consistent eating pattern across weekdays/weekends

Members (n > 10,000) have maintained at least a 30 pound weight loss for one year or longer.


---

One-year Weight Losses in the Look AHEAD Study: Factors Associated With Success

Thomas A. Wadden1, Delia S. West2, Rebecca H. Neberg2, Rena R. Wing1, Donna H. Ryan4, Karen C. Johnson1, John P. Foreyt1, James O. Hill5, Dace L. Trence6,7,8 and Mara Z. Vitolins6,8; Look AHEAD Research Group

A further analysis of the first year weight losses in the Look AHEAD (Action for Health in Diabetes) Study identified factors associated with success.

5,145 men and women with type 2 diabetes were recruited at 16 sites.

Percentage Reduction in Initial Weight at 1 Year Based on Quartile of Average Weekly Minutes of Self-Reported Physical Activity

The number within each bar shows the mean number of weekly minutes of physical activity.

Percentage Reduction in Initial Weight at 1 Year Based on Quartile of Percentage of Possible Visits Attended

The number within each bar shows the mean percentage of visits attended for that quartile.

Percentage Reduction in Initial Weight at 1 Year Based on Quartile of Meal Replacement (MR) Products Used

The number within each bar shows the mean number of products used in that quartile.

HR and 95% CI of Obesity Risk Based on Breakfast Frequency: CARDIA Years 7–25 (1992–1993 to 2010–2011)

<table>
<thead>
<tr>
<th>Breakfast frequency (days/week)</th>
<th>0–3</th>
<th>4–6</th>
<th>7</th>
<th>P trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal obesity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n cases/n</td>
<td>470/1,138</td>
<td>202/610</td>
<td>300/1,101</td>
<td></td>
</tr>
<tr>
<td>Incidence rate</td>
<td>23.4</td>
<td>17.4</td>
<td>13.4</td>
<td></td>
</tr>
<tr>
<td>Model 1: HR (95% CI)</td>
<td>1.0</td>
<td>0.75 (0.63–0.89)</td>
<td>0.60 (0.51–0.71)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Model 2a: HR (95% CI)</td>
<td>1.0</td>
<td>0.84 (0.70–0.99)</td>
<td>0.78 (0.66–0.91)</td>
<td>0.001</td>
</tr>
<tr>
<td>Obesity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n cases/n</td>
<td>392/1,064</td>
<td>165/579</td>
<td>226/1,068</td>
<td></td>
</tr>
<tr>
<td>Incidence rate</td>
<td>20.3</td>
<td>14.6</td>
<td>10.1</td>
<td></td>
</tr>
<tr>
<td>Model 1: HR (95% CI)</td>
<td>1.0</td>
<td>0.75 (0.62–0.90)</td>
<td>0.57 (0.47–0.68)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Model 2b: HR (95% CI)</td>
<td>1.0</td>
<td>0.85 (0.71–1.03)</td>
<td>0.80 (0.67–0.96)</td>
<td>0.011</td>
</tr>
</tbody>
</table>
Low Dietary Energy Density (i.e., Fruits and Vegetables) is Associated with Lower Body Weight, 2005–2008 NHANES

- A significant positive association was found between dietary ED and body weight status;
- Obese men had a significantly higher ED than over weight or lean men (1.96 vs. 1.91 vs. 1.81 kcal/g, p trend < 0.0001); Obese women had a significantly higher ED than lean women (1.89 vs. 1.87 vs. 1.80, p trend 0.002)

Bars with differing superscripts are significantly different at p>0.05


**ORIGINAL RESEARCH**

**Single-Component Versus Multicomponent Dietary Goals for the Metabolic Syndrome**

**A Randomized Trial**

Randomized trial conducted to evaluate a diet focused on increased fiber consumption versus the multicomponent American Heart Association (AHA) Dietary Guidelines. Participants were 240 adults with the metabolic syndrome.

High-Fiber Diet: participants received instructions on how to increase their fiber intake, and no physical activity recommendations were made

AHA Diet: Participants received instructions for the AHA diet, including increasing fiber. Energy intake goals were calculated by subtracting 500 to 1000 calories per day to achieve a weekly weight loss of 0.5 to 0.9 kg. Each participant was given a customized goal of < 7% saturated fat, and no physical activity recommendations were made.

A Single Component Dietary Intervention Focusing on a Targeted Fiber Goal can Achieve Clinically Meaningful Weight Loss Similar to a Multicomponent AHA Diet.

At 12 months, weight loss was -2.1 kg (CI, -2.9 to -1.3 kg) and -2.7 kg (CI, -3.5 to -2.0 kg) for the high-fiber and AHA diet groups, respectively; the mean between group difference was 0.6 kg (CI, -0.5 to 1.7 kg).


Dietary Guidelines, 2010
Executive Summary

The Dietary Guidelines recommendations encompass two overarching concepts:

- Maintain calorie balance over time to achieve and sustain a healthy weight
  - People who are most successful at achieving and maintaining a healthy weight do so through continued attention to consuming only enough calories from foods and beverages to meet their needs and by being physically active.

- Focus on consuming nutrient-dense foods and beverages
  - A healthy eating pattern limits intake of sodium, solid fats, added sugars, and refined grains and emphasizes nutrient-dense foods and beverages—vegetables, fruits, whole grains, fat-free or low-fat milk, and milk products, seafood, lean meats and poultry, eggs, beans and peas, and nuts and seeds.
Percentage of the Adult Population (Aged ≥ 19 Years) by Bodyweight Status with Vitamin and Mineral Intakes Below the EAR for Individuals (Data from NHANES 2001–2008)

Increasing BMI Category is Associated with Prevalence of Low Plasma Nutrient Levels (Men)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Overweight</th>
<th>Obese</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Carotenoids</td>
<td>17%</td>
<td>30%</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>30%</td>
<td>34%</td>
</tr>
<tr>
<td>Folate</td>
<td>23%</td>
<td>25%</td>
</tr>
<tr>
<td>Vitamin B₁₂</td>
<td>13%</td>
<td>14%</td>
</tr>
</tbody>
</table>


Increasing BMI Category is Associated with Prevalence of Low Plasma Nutrient Levels (Post-Menopausal Women)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Overweight</th>
<th>Obese</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Carotenoids</td>
<td>13%</td>
<td>29%</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>15%</td>
<td>22%</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>11%</td>
<td>18%</td>
</tr>
<tr>
<td>Folate</td>
<td>9%</td>
<td>14%</td>
</tr>
<tr>
<td>Vitamin B₁₂</td>
<td>19%</td>
<td>15%</td>
</tr>
</tbody>
</table>

Diet Quality (i.e., Score) is Lower for Blacks vs Whites in Low and High Education Cohorts (CARDIA Study)


Poor Nutritional Status Predicts Poor Stroke Outcomes

Consequences of Malnutrition in Hospitalized Patients

• Malnourished patients have longer hospital stays, higher rates of infection and pressure ulcers, delayed wound healing, and require more medications (Naber et al. Am J Clin Nutr. 1997;66:1232-1239).

Emerging Evidence Suggests Differences between Races and Micronutrient Status with Cardiometabolic Risk Biomarkers

• Lower levels of β-carotene and vitamin C were associated with risk markers of cardiometabolic disease (higher insulin resistance and fasting insulin, and leukocyte count, respectively) in African Americans but not whites. (Suarez & Schramm-Sapyta. Nutr Res. 2014;34:1-10).
Choose MyPlate “Menu” of Selected Consumer Messages

1. Balancing calories
2. Foods to increase
3. Foods to reduce
SuperTracker

• Get your personalized nutrition and physical activity plan.
• Track your foods and physical activities to see how they stack up.
• Get tips and support to help you make healthier choices and plan ahead.

Resources

NIH -- Choosing a Safe and Successful Weight-Loss Program

NIH -- Weight-Loss and Nutrition Myths

Academy of Nutrition and Dietetics -- 6 Tips on Losing Weight
http://www.eatright.org/resource/health/weight-loss/tips-for-weight-loss/6-tips-on-losing-weight-for-your-next-big-event

CDC -- Healthy Weight
http://www.cdc.gov/HEALTHYWEIGHT/LOSING_WEIGHT/INDEX.HTML
Conclusions

• The weight-loss diet landscape is littered with popular diets that are problematic.

• Nutrient status of Americans is poor and even worse for overweight/obese individuals and ethnic minorities.

• Many start a nutritionally inadequate weight-loss diet in a poor nutritional state and run an increased risk of adverse health consequences.

• Take home message: Help patients follow nutritionally adequate weight loss and weight maintenance diets.

Thank You!