Obesity Medicine

Obesity Pathophysiology & AACE CPG’s
Lifestyle Management
Medical Management of Obesity
Surgical Management of Obesity

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LIFESTYLE MANAGEMENT
DIET, ACTIVITY/EXERCISE AND BEHAVIORAL SUPPORT

Dr. Meera Shah
Learning Objectives

• Understand principles of effective lifestyle intervention

• Understand the impact of dietary change, physical activity and weight loss on the prevention of type 2 diabetes

• Appreciate the challenges related to weight maintenance and describe evidence-based strategies that may help
Prevalence** of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2014

* Sample size <50 or the relative standard error (dividing the standard error by the prevalence) ≥30%

** Prevalence estimates reflect BRFSS methodological changes started in 2011; these estimates should not be compared to prevalence estimates before 2011
Patient encounter (see box 1) → Measure weight, height; calculate BMI (see box 2) → BMI 25-29.9 (overweight) or 30-34.9 (class I obese) or 35-39.9 (class II obese) or ≥40 (class III obese) (see box 3) → Yes BMI ≥25 → Assess and treat risk factors for CVD and obesity-related comorbidities (see box 4) → No BMI 18.5-24.9 → Measure weight and calculate BMI annually or more frequently (see box 17) → Advise to avoid weight gain; address and treat other risk factors (see box 7) → Follow-up and weight loss maintenance (see box 15) → Intensive behavioral treatment (see box 10); reassess and address medical or other contributory factors; consider adding or reevaluating obesity pharmacotherapy (see box 12), and/or refer to an experienced bariatric surgeon (see box 13) → Weight loss ≥5% and sufficient improvement in health targets (see box 18) → Yes → Continue intensive medical management of CVD risk factors and obesity-related conditions; weight management options (see box 19) → No → BMI ≥40 or BMI ≥35 with comorbidity. Offer referral to an experienced bariatric surgeon for consultation and evaluation as an adjunct to comprehensive lifestyle intervention (see box 13) → Yes → Comprehensive lifestyle intervention alone or with adjunctive therapies (BMI ≥30 or ≥27 with comorbidity) (see box 10) → No → BMI ≥30 or BMI ≥27 with comorbidity → Option for adding pharmacotherapy as an adjunct to comprehensive lifestyle intervention (see box 12) → Yes → Assess readiness to make lifestyle changes to achieve weight loss (see box 8) → No, not yet ready → Assess need to lose weight: BMI ≥30 or BMI 25-29.9 with risk factor(s) (see box 6) → Yes → High-intensity comprehensive lifestyle intervention (see box 11a) → No, insufficient risk → Alternative delivery of lifestyle intervention (see box 11b) → Yes → Weight loss ≥5% and sufficient improvement in health targets (see box 14) → Yes → Determine weight loss and health goals and intervention strategies (see box 9) → No, not yet ready → Evaluate weight and lifestyle histories (see box 5) → Yes → Assess and treat risk factors for CVD and obesity-related comorbidities (see box 4) → No → Yes → Yes, ready → Yes → Executive Summary: Guidelines (2013) for the Management of Overweight and Obesity in Adults. Obesity. Vol. 22 Supp 2. July 2014
Comprehensive Lifestyle Interventions

Who is a “trained interventionist?”

• Behavioral psychologists
• Dietitians
• Exercise specialists
• Lifestyle coaches
High Intensity Comprehensive Lifestyle Intervention for Weight Loss

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High Intensity Lifestyle Intervention
Diabetes Prevention Program

3000+ overweight/obese subjects (BMI 34 kg/m²) with IFG/IGT
ILI vs. metformin+ std lifestyle vs. placebo + std. lifestyle

Intensive lifestyle intervention

• Detailed advice to help achieve 5-10% weight loss:
  - Decreased dietary total fat (<30%)
  - Decrease saturated fat (<7%)
  - Increased fiber (15 g/1000 kcal)
  - 150 min/week exercise

Standard

• General oral and written information about diet and exercise

Goal: Achieve and maintain > 7% body weight loss

Changes in Body Weight, Leisure Physical Activity and Adherence to Medication Regimen

(A) Change in Weight (kg)

(B) Change in Physical Activity (MET-hr/wk)

(C) Medication Adherence (%)
Intensive lifestyle intervention reduces diabetes incidence in at-risk population

58% reduction in incidence vs. placebo

NNT with ILI = 6.9 to prevent 1 case of DM2 over 3 years
Look AHEAD Interventions

Intensive Lifestyle Intervention

✓ Calorie restriction
  • < 250 lbs: 1200-1500 kcal/day
  • > 250 lbs: 1500-1800 kcal/day
  • Meal replacements
    ▪ first 6 months 2/day; second 6 months 1/day

✓ Exercise >175 minutes/week
  • Moderate intensity
  • Pedometers > 10,000 steps per day

✓ Weekly group/individual counseling sessions for 6 months
Look AHEAD Interventions

Control

- 3 group sessions per year
- Diet, exercise, social support for 4 years
Looking Ahead Trial

Weight

Estimated mean (kg)

Main effect, -4 (95% CI, -5 to -3)
P<0.001

Look AHEAD Research group; NEJM 2013
No difference in cardiovascular outcomes

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<th>Years</th>
<th>No. at risk</th>
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<tr>
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<td>Control</td>
</tr>
<tr>
<td>0</td>
<td>2575</td>
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<tr>
<td>2</td>
<td>2425</td>
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<tr>
<td>4</td>
<td>2296</td>
</tr>
<tr>
<td>6</td>
<td>2156</td>
</tr>
<tr>
<td>8</td>
<td>2019</td>
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<tr>
<td>10</td>
<td>688</td>
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Hazard ratio, 0.95 (95% CI, 0.80-1.09)  
P=0.51

Look AHEAD Research group; NEJM 2013
Clinically significant weight loss can be achieved at 1 Year with High-Intensity Lifestyle Interventions

**High-Intensity Lifestyle Intervention**
- Look AHEAD
- DPP
- Teixeira, et al.

**Pharmacotherapy Intervention**
- Placebo
- Orlistat
- Lorcaserin
- Liraglutide
- Phentermine-topiramate
- Naltrexone-bupropion

Legend:
- ≥10%
- ≥5%

Percentage of Participants

Weight loss is heterogeneous

12-Month weight change (%)

Control group (n = 88)

Mean change = $-1.7 \pm 5.0\%$ ($-1.7 \pm 4.9\%$)
Subjects below $-5\%$ = 20% (16%)
Subjects below $-10\%$ = 7% (4%)

Intervention group (n = 106)

Mean change = $-7.3 \pm 5.9\%$ ($-7.1 \pm 7.0\%$)
Subjects below $-5\%$ = 65% (61%)
Subjects below $-10\%$ = 32% (29%)

24-Month weight change (%)

Control group (n = 80)

Mean change = $-2.2 \pm 7.5\%$ ($-1.9 \pm 6.9\%$)
Subjects below $-5\%$ = 28% (19%)
Subjects below $-10\%$ = 12% (8%)

Intervention group (n = 103)

Mean change = $-5.5 \pm 7.7\%$ ($-4.9 \pm 7.5\%$)
Subjects below $-5\%$ = 50% (45%)
Subjects below $-10\%$ = 18% (18%)

Teixeira et al, Obesity 2012
Lessons Learned From Lifestyle Intervention Studies

✔ Dietary change with calorie restriction leads to weight loss
  • Multiple dietary restrictions are difficult for our patients to implement
  • Meal replacements represent a reasonable option to introduce a calorie restriction

✔ Exercise
  • Recommendations for physical activity are the most easily implemented by study subjects
    ▪ Minutes/week; Steps per day
Lessons Learned From Lifestyle Interventions Studies

✓ Metabolic benefit may not rely solely on the amount of weight loss achieved

✓ Intensity of lifestyle intervention will impact amount of weight loss
WHAT TO KNOW ABOUT DIETARY INTERVENTIONS?
Amount of weight loss was associated with self-reported dietary adherence level ($r = 0.60; P < .001$) but not with diet type.
Stop the Diet Debate!
Comparison of Weight-Loss Diets With Different Compositions of Fat, Protein and Carbohydrates

Mean Change in Body Weight and Waist Circumference from Baseline to 2 Years According to Dietary Macronutrient Content.
DIRECT: A Workplace Intervention for Weight Loss

- **Adherence**
  - 85% at 2-yrs (90% low-fat, 85% Med, 78% low-carb)
- **Outcomes**
  - Low-carb: greatest ↓ in T-Chol/HDL ratio and CRP
  - Mediterranean: greatest ↓ in FBG among T2DM, but limited by small n

<table>
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<th>Weight loss (kg)</th>
<th>Low-fat</th>
<th>Mediterranean</th>
<th>Low-carb</th>
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<tr>
<td>All subjects, 2 yrs</td>
<td>2.9</td>
<td>4.4</td>
<td>4.7</td>
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<tr>
<td>Completers, 2 yrs (n=272)</td>
<td>3.3</td>
<td>4.6</td>
<td>5.5</td>
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<tr>
<td>Completers, 6 yrs (n=259)</td>
<td>0.6</td>
<td>3.1</td>
<td>1.7</td>
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Shai et al, *NEJM* 2008 and *NEJM* 2012
Preventing DM 2 with dietary intervention (independent of weight loss)

✓ Low Fat Diet (< 20% of calories; incr. fruits/veg/grains)
  • WHI Dietary Modification Trial
    After 8 years: ↓ glucose
    25% ↓ in conversion from NGT to IFG

✓ Mediterranean Diet
  • Supplemented with olive oil/nuts
  • Lower incidence for the development of DM2

Howard et al, Diabetes Care 2018
PREDIMED Study, Diabetes Care 2011
What is the Best Use of Your Time?

Encourage **self monitoring** of eating habits

![Graph showing weight change (kg) vs. Food records (week) for different groups: AA women, AA men, Non-AA women, Non-AA men.](image-url)
WHAT ABOUT EXERCISE?
Adults need a mix of physical activity to stay healthy.

**Moderate-intensity aerobic activity**
Anything that gets your heart beating faster counts.

- **at least 150 minutes a week**

**Muscle-strengthening activity**
Do activities that make your muscles work harder than usual.

- **at least 2 days a week**

*If you prefer vigorous-intensity aerobic activity (like running), aim for at least 75 minutes a week.*

If that’s more than you can do right now, **do what you can**. Even 5 minutes of physical activity has real health benefits.

**Walk. Run. Dance. Play.** **What’s your move?**
Preventing Type 2 DM with Exercise

• Exercise decreases risk for developing DM 2
  • Regular moderate physical activity (brisk walking)
    ▪ RR 0.69

• 150 minutes of exercise per week
  ▪ Weight training      RR 0.66
  ▪ Aerobic activity     RR 0.48

DaQing IGT and Diabetes Study, Diabetes Care 1997
Finnish Diabetes Prevention Study Group, NEJM 2001
American Diabetes Association Consensus statement on Physical Activity, 2006
HOW TO PROMOTE WEIGHT MAINTENANCE?
Weight Loss Maintenance

Adjusted Weight Change by Treatment Group

Svetkey et al: JAMA 2008

Month relative to randomization

Weight change (kg)

Phase 1

Phase 2

Self-directed (n=341)

Personal contact (n=341)

Interactive technology (n=347)
Contributors to weight regain

• Drop in resting energy expenditure
• Non-adherence to dietary and activity changes implemented
Biggest Losers Fight a Slower Metabolism

A study of contestants from “The Biggest Loser” found their metabolisms slowed during and after the competition, making it difficult to maintain weight loss.

**REGAINING LOST WEIGHT**
13 of the 14 contestants studied regained weight in the six years after the competition. Four contestants are heavier now than before the competition.

- **Erinn Egbert** is the only contestant who weighs less today than six years ago.
- **Rudy Pauls** regained 80 percent of his lost weight, then had surgery to reduce the size of his stomach.
- **Danny Cahill** lost 239 pounds and won the competition, but has regained over 100 pounds.

**A SLOWING METABOLISM**
Nearly all the contestants have slower metabolisms today than they did six years ago, and burn fewer calories than expected when at rest.

- **Danny Cahill** now burns 800 fewer calories a day than expected.
- **Rudy Pauls**
- **Erinn Egbert**

Body burns 200 more cal. a day

Sources: Obesity; individual contestants

By The New York Times
Physiologic Factors
Differences in Metabolic Rates

Obese 50 y/o male, 180 cm initially at 250lbs, now at 212 lbs

- Weight loss 15%
- Decrease 15% of energy requirements
- HB equation – 15%=
- 1863 – 2235 kcal/day

Never Obese 50 y/o male, 180 cm at 212 lbs

- Stable
- Stable
- HB equation
- 2191-2630 kcal/day

This deficit can persist for 3-5 years
# High intensity comprehensive lifestyle intervention for Weight Maintenance

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Weight Maintenance and Relapse After Weight Loss in Obese Women

**Maintenance of average weight (n = 30)***
- Exercise regularly (90%)
- Problem solve (95%)
- Social support (70%)
- Personalized diet (70%)

**Relapse to > 20% overweight (n = 44)†**
- Limited exercise (67%)
- Escape-avoidance (90%)
- Limited support (62%)
- Emotional eaters (70%)

Weight Loss-Maintenance Strategies

Exercise

• Group vs home exercise (n.s.)
  o Perri M et al. JCCP 1997;65:278.

• Structured vs lifestyle exercise (n.s.)
  o Anderson et al. JAMA 1999;281:335.

• Short vs long-bout exercise (frequent, intense short bouts best)
Promoting Lifestyle Interventions

✓ Identify Resources in your community
  • Dietitians
  • YMCA DPP program
  • Behavioral Psychologists

✓ Assess your patient’s readiness to pursue lifestyle intervention

✓ Medical provider support for patient’s efforts at lifestyle changes is important

✓ Dietary change leading to calorie restriction is key
  • Any diet works if your patient can adhere
  • Consider the use of meal replacements
  • Encourage your patient to track dietary intake
Clinical Pearls from Lifestyle Intervention Studies?

✓ Mediterranean diet may offer an additional benefit towards DM 2 prevention

✓ Promote physical activity
  • Agree on specific activity goals
    ▪ Steps/day
    ▪ Minutes/week
      o For weight loss  150-175 minutes/week
      o For weight maintenance > 200 minutes/week
  • Address medical obstacles
  • Can independently lower risk for DM 2

✓ Support
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