This presentation will:

• Present the biological and environmental factors contributing to the obesity epidemic

• Discuss the lifestyle modification therapy for patients with obesity, prediabetes, and diabetes

• Outline the model for care of the overweight or obese patient, based on the AACE comprehensive diabetes algorithm

• Explain the implications of lifestyle modification on the prevention of prediabetes and diabetes

AACE = American Association of Clinical Endocrinologists
Age-Adjusted Prevalence of Obesity and Diagnosed Diabetes Among U.S. Adults

Obesity (BMI ≥30 kg/m²)

### 1994

- No Data
- <14.0%
- 14.0%–17.9%
- 18.0%–21.9%
- 22.0%–25.9%
- > 26.0%

### 2000

- No Data
- <14.0%
- 14.0%–17.9%
- 18.0%–21.9%
- 22.0%–25.9%
- > 26.0%

### 2013

- No Data
- <14.0%
- 14.0%–17.9%
- 18.0%–21.9%
- 22.0%–25.9%
- > 26.0%

Diabetes

### 1994

- No Data
- <4.5%
- 4.5%–5.9%
- 6.0%–7.4%
- 7.5%–8.9%
- > 9.0%

### 2000

- No Data
- <4.5%
- 4.5%–5.9%
- 6.0%–7.4%
- 7.5%–8.9%
- > 9.0%

### 2013

- No Data
- <4.5%
- 4.5%–5.9%
- 6.0%–7.4%
- 7.5%–8.9%
- > 9.0%

BMI = body mass index; CDC = U.S. Center for Disease Control and Prevention.

Obesity Conceptual Framework

Obesity directly and indirectly promotes and/or causes adverse health consequences.

Current evidence indicates that obesity must be treated as a chronic, relapsing disease.

Adverse Health and Social Consequences Associated with Obesity

<table>
<thead>
<tr>
<th>PHYSICAL</th>
<th>PSYCHOSOCIAL</th>
<th>FUNCTIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer</td>
<td>Depression</td>
<td>Absenteeism from school or work</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>Discrimination</td>
<td>Disability</td>
</tr>
<tr>
<td>Cholestasis</td>
<td>Low self-esteem</td>
<td>Disqualification from active military/fire/police services</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>Negative body image</td>
<td>Low physical fitness level</td>
</tr>
<tr>
<td>Gallbladder disease</td>
<td>Negative stereotyping</td>
<td>Mobility limitations</td>
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<tr>
<td>Glucose intolerance and insulin resistance</td>
<td>Social marginalization</td>
<td>Reduced academic performance</td>
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<tr>
<td>Hepatic steatosis</td>
<td>Teasing and bullying</td>
<td>Reduced productivity</td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td>Unemployment</td>
</tr>
<tr>
<td>Hyperuricemia and gout</td>
<td></td>
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<tr>
<td>Menstrual abnormalities</td>
<td></td>
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<tr>
<td>Orthopedic problems</td>
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<tr>
<td>Reduction of cerebral blood flow</td>
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<tr>
<td>Sleep apnea</td>
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<tr>
<td>T2DM</td>
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</tbody>
</table>

T2DM = type 2 diabetes mellitus.

Relationship Between BMI and Risk of T2DM

BMI = body mass index; T2DM = type 2 diabetes mellitus.

Obesity Classification: BMI

Patients with overweight/obesity
= increased body fat (adiposity)

Overweight and obesity classification:
body mass index (BMI) in kg/m²

Normal weight (18.5–24.9)
Overweight (25.0–29.9)
Class I obesity (30.0–34.9)
Class II obesity (35.0–39.9)
Class III obesity (≥40.0)

ACTION ITEM:
For all patients, calculate BMI at annual visits or more frequently and identify body weight classification.

BMI = body mass index.

Treatment: Modest Weight Loss = Major Health Benefits

≥5% weight loss
- T2DM prevention
- With T2DM: better glycemic control/medication reduction
- Improvement in urinary stress incontinence, mobility, joint pain, weight-related QOL
- Improvements in CVD risk factors (HDL-C, TG, BP)

≥10% weight loss
- Previous improvements
- Sleep apnea
- Diabetes remission?

≥15% weight loss
- Previous improvements
- CVD mortality
- All-cause mortality and reduction in cancer risk (with surgical weight loss)

ACTION ITEM:
Consider the benefits that a 5% to 10% weight loss will have on your patients with overweight or obesity.

BP = blood pressure; CVD = cardiovascular disease; HDL-C = high density lipoprotein-cholesterol; QOL = quality of life; T2DM = type 2 diabetes mellitus; TG = triglycerides.

Blackburn G. Obes Res. 3(suppl 2):211s-216s. 1995.
Cause of Obesity: Abnormal Energy Balance

Energy intake
- Ingestion of:
  - Proteins
  - Fats
  - Carbohydrates

Energy expenditure
- Basal metabolic rate
- Physical activity
- Energy to metabolized food

Body Weight

Increase

Decrease

Human being: biological and behavioral interface
Thrifty Genes Contribute to Morbid Obesity

• Genetic factors account for 80% of a person’s tendency to develop obesity

• “Thrifty genes” are designed to protect us from starvation by allowing us to store large amounts of energy in the form of fat when food is abundant

• This is the first time in human history that food has been so abundant

• The age-old advantage of thrifty genes has been influenced by our unique environment to cause disease

Lifestyle Modification: Physical Activity Guidelines and Recommendations

• Talk about physical activity (not “exercise”)
• Some is better than none
• ≥150 min/wk of moderate intensity activity
• Both aerobic (endurance) and strengthening (resistance) activity are beneficial

Garber et al. Consensus Statement by the American Association of Clinical Endocrinologists and American College of Endocrinology on the Comprehensive Type 2 Diabetes Management Algorithm - 2016 Executive Summary. Endocr Pract. 2016;22(No. 1)
Sedentary Lifestyles – Examples

Physical activity is...

• To be avoided
• Nearly unnecessary
• Limited by infrastructure
The “Toxic Environment”

High-Calorie Food is...

- Highly palatable
- Near-ubiquitous
- Heavily advertised
- Supersized

Interventions to Reduce the Risks Associated with Prediabetes

• Intensive lifestyle management is the cornerstone of all prevention efforts

• No pharmacologic agents are currently approved for the management of prediabetes
  – Pharmacotherapy targeted at glucose may be considered in high-risk patients after individual risk:benefit analysis
Components of Therapeutic Lifestyle Change

• Nutrition
  – Reduced calorie diet
  – Healthy eating
• Sufficient physical activity
• Avoidance of tobacco products
• Limited alcohol consumption
• Sufficient sleep
• Stress reduction (including behavioral therapy as necessary)
Intensive Lifestyle Intervention Prevents Progression from IGT to T2DM

**Diabetes Prevention Program (N=3234)**

- **Intensive lifestyle intervention**, (n=1079)
  - Diabetes Incidence: 4.8 per 100 Person-Years
  - Decrease: 58%

- **Metformin 850mg BID**, (n=1073)
  - Diabetes Incidence: 7.8 per 100 Person-Years
  - Decrease: 31%

- **Placebo**, (n=1082)
  - Diabetes Incidence: 11 per 100 Person-Years

**Goal**: 7% reduction in baseline body weight through low-calorie, low-fat meal plan and ≥150 min/week moderate intensity physical activity.

IGT = impaired glucose tolerance; T2DM = type 2 diabetes mellitus.

# NHLBI Obesity Treatment Guidelines

## A Guide to Selecting Treatment

<table>
<thead>
<tr>
<th>BMI Category (kg/m²)</th>
<th>Treatment</th>
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<tbody>
<tr>
<td></td>
<td>Diet, physical activity, and behavior</td>
</tr>
<tr>
<td>25–26.9</td>
<td>Appropriate NHLBI Guidelines +</td>
</tr>
<tr>
<td>27–29.9</td>
<td>+</td>
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<tr>
<td>30–34.9</td>
<td>+</td>
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<tr>
<td>35–39.9</td>
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<tr>
<td>≥40</td>
<td>+</td>
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<table>
<thead>
<tr>
<th>Phar macotherapy</th>
<th>No with comorbidities</th>
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<tbody>
<tr>
<td>25–26.9</td>
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<td>27–29.9</td>
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<table>
<thead>
<tr>
<th>Surgery*</th>
<th>No</th>
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<tbody>
<tr>
<td>25–26.9</td>
<td>No</td>
</tr>
<tr>
<td>27–29.9</td>
<td>No with comorbidities</td>
</tr>
<tr>
<td>30–34.9</td>
<td>No LAGB only</td>
</tr>
<tr>
<td>35–39.9</td>
<td>With comorbidities</td>
</tr>
<tr>
<td>≥40</td>
<td>+</td>
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</tbody>
</table>

*Bariatric surgeries require lifestyle medical follow-up.

†FDA approved gastric band surgery for patients with BMI ≥30 and one weight related medical condition (February 2011).

BMI = body mass index; FDA = U.S. Food and Drug Administration; LAGB = laparoscopic adjustable gastric banding; NHLBI = National Heart, Lung, and Blood Institute.

Set Realistic Goals with Your Patient

**Goal:** decrease risk of complications and improve long-term outlook

**Ask patient: What are your goals?**

*Patients often want to lose ~30% of body weight*  
(a loss of “only” 7% to 10% or less may be equated with failure)

**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: maintenance
- Long-term goal (if desired): additional energy deficit recalculated for next weight loss goal

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

Summary

- Lifestyle intervention effectively prevents diabetes and adverse cardiovascular outcomes
  - Lifestyle alone is less effective in more obese populations
- Weight loss with lifestyle change is difficult to maintain long-term
  - Ongoing behavioral support from healthcare team and/or structured support group can help patients maintain weight loss
  - Benefits of initial weight loss are sustained even with weight regain
- Medical interventions are more effective when combined with lifestyle change
- Healthcare professionals should work with patients to set realistic goals and encourage adherence to weight loss/maintenance behaviors