AACE/ACE ALGORITHM FOR THE MEDICAL CARE OF PATIENTS WITH OBESITY

OBESITY RESOURCE CENTER COMMITTEE

Alan Garber, MD, PhD, FACE - Chair
W. Timothy Garvey, MD, FACE - Vice Chair
Etie S. Moghissi, MD, FACE, FACP - Vice Chair
Elise Brett, MD, FACE, ECNU
Elena A. Christofides, MD, FACE
Janet McGill, MD, FACE
Jeffrey I. Mechanick, MD, FACN, FACP, FACE, ECNU
Karl Nadolsky, DO

VIEW THE AACE OBESITY GUIDELINES AT WWW.AACE.COM/FILES/FINAL-APPENDIX.PDF
ALGORITHM COMPONENTS

1. Obesity Screening
2. Diagnosis
3. Treatment: Goals and Considerations
4. Follow-Up
1. AACE/ACE ALGORITHM FOR THE MEDICAL CARE OF PATIENTS WITH OBESITY

**Obesity Screening**

1. Screen positive for overweight or obesity
   
   **BMI ≥25 kg/m²**
   
   (≥23 kg/m² in some ethnicities)

2. Presence of weight-related disease or complication that could be improved by weight loss therapy
AACE/ACE ALGORITHM FOR THE MEDICAL CARE OF PATIENTS WITH OBESITY

ALGORITHM COMPONENTS

1. Obesity Screening

2. Diagnosis

3. Treatment: Goals and Considerations

4. Follow-Up
2. Diagnosis: Evaluation

Evaluate Patient

1. Medical history
2. Physical examination
3. Clinical laboratory tests
4. Review of systems, emphasizing weight-related complications
5. Obesity history: graph weight vs age, lifestyle patterns/preferences, previous interventions
2. Clinical interpretation of BMI: Ensure elevated BMI is indicative of excess adiposity by assessing: age, gender, muscularity, hydration status, edema, third space fluid collection, large tumors, sarcopenia

2. Waist circumference if BMI <35 kg/m²: Adds information pertaining to cardiometabolic disease risk; use gender- and ethnicity-specific cut-off values

3. Can consider body composition technologies: eg, bioelectrical impedance, air/water displacement plethysmography, or dual-energy x-ray absorptiometry scan

Abbreviation: BMI = body mass index
# Diagnosis: Clinical Component

## Evaluate for a Checklist of Weight-Related Complications

<table>
<thead>
<tr>
<th>Patients Present with Overweight or Obesity (Anthropometric Component)</th>
<th>Candidates for Weight Loss Therapy</th>
<th>Patients Present with Weight-Related Disease or Complication (Clinical Component)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients present with BMI ≥25 kg/m², or ≥23 kg/m² in certain ethnicities, and excess adiposity</td>
<td>Evaluate for weight-related complications</td>
<td>Prediabetes</td>
</tr>
<tr>
<td>Evaluate for overweight or obesity</td>
<td></td>
<td>Metabolic Syndrome</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Type 2 Diabetes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dyslipidemia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hypertension</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cardiovascular Disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nonalcoholic Fatty Liver Disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Polycystic Ovary Syndrome</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Female Infertility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Male Hypogonadism</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Obstructive Sleep Apnea</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asthma/Reactive Airway Disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Osteoarthritis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Urinary Stress Incontinence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gastroesophageal Reflux Disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depression</td>
</tr>
</tbody>
</table>
## Diagnosis: Clinical Component

### Checklist of Weight-Related Complications:
Screening and Diagnoses in Patients with Overweight/Obesity

#### Metabolic Complications

<table>
<thead>
<tr>
<th>Weight-Related Complication</th>
<th>Basis for Screening and/or Diagnosis</th>
<th>Suggested Secondary Testing When Needed To Confirm Diagnosis, Stage Severity, or Guide Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prediabetes</strong></td>
<td>Fasting glucose; A1C; 2-hour OGTT glucose</td>
<td>If fasting glucose is 100-125 mg/dL, a repeat elevated fasting glucose completes diagnosis of IFG; however, 2-hour OGTT should also be performed to exclude diabetes and IGT. Fasting and 2-hour OGTT should be performed if initial fasting glucose is normal and A1C is elevated, or in high-risk patients based on family history or metabolic syndrome.</td>
</tr>
<tr>
<td><strong>Metabolic Syndrome</strong></td>
<td>Waist circumference, blood pressure, fasting glucose, triglycerides, HDL-C</td>
<td>Initial evaluation completes diagnosis; OGTT to test for IGT or diabetes.</td>
</tr>
<tr>
<td><strong>Type 2 Diabetes</strong></td>
<td>Fasting glucose; A1C; 2-hour OGTT glucose; symptoms of hyperglycemia</td>
<td>Overtly elevated (i.e., ≥200 mg/dL) or a repeat fasting glucose ≥126 mg/dL completes diagnosis. If fasting glucose and/or A1C is consistent with prediabetes, 2-hour OGTT should be performed to test for diabetes. A1C should be performed to help guide therapy.</td>
</tr>
<tr>
<td><strong>NAFLD/NASH</strong></td>
<td>Physical exam; LFTs</td>
<td>Imaging (eg, ultrasound, MRI, elastography) and/or liver biopsy needed to complete diagnosis.</td>
</tr>
</tbody>
</table>

**Abbreviations:** A1C = glycated hemoglobin; HDL-C = high-density lipoprotein cholesterol; IGT = impaired glucose tolerance; LFTs = liver function tests; MRI = magnetic resonance imaging; OGTT = oral glucose tolerance test
## CHECKLIST OF WEIGHT-RELATED COMPLICATIONS: SCREENING AND DIAGNOSES IN PATIENTS WITH OVERWEIGHT/OBESITY

### Cardiovascular Complications

<table>
<thead>
<tr>
<th>Weight-Related Complication</th>
<th>Basis for Screening and/or Diagnosis</th>
<th>Suggested Secondary Testing When Needed To Confirm Diagnosis, Stage Severity, or Guide Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyslipidemia</td>
<td>Lipid panel (total cholesterol, HDL-C, triglycerides, LDL-C, non-HDL-C)</td>
<td>Lipid panel completes diagnosis; lipoprotein subclasses, Apo B-100 may further define risk.</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Sitting blood pressure</td>
<td>Repeat elevated blood pressure measurements to complete diagnosis; home blood pressure or ambulatory blood pressure monitoring may help complete testing.</td>
</tr>
<tr>
<td>Cardiovascular Disease</td>
<td>Physical exam; ROS; history and medical records</td>
<td>Additional testing based on findings and risk status (eg, ankle-brachial index, stress testing, coronary artery calcium score and the MESA risk score calculator, arteriography, carotid ultrasound).</td>
</tr>
</tbody>
</table>

**Abbreviations:** Apo B = ; HDL-C = high-density lipoprotein cholesterol; LDL-C = low-density lipoprotein cholesterol; MESA = ; ROS = review of symptoms
## Diagnosis: Clinical Component

### Checklist of Weight-Related Complications: Screening and Diagnoses in Patients with Overweight/Obesity

#### Organ-Specific, Hormonal, and Mechanical Complications

<table>
<thead>
<tr>
<th>Weight-Related Complication</th>
<th>Basis for Screening and/or Diagnosis</th>
<th>Suggested Secondary Testing When Needed To Confirm Diagnosis, Stage Severity, or Guide Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCOS and Female Infertility</td>
<td>Physical exam, ROS, menstrual and reproductive history</td>
<td>Hormonal testing (e.g., androgen levels, SHBG, LH/FSH, estradiol), ovulation testing, imaging of ovaries, may be needed to complete diagnosis.</td>
</tr>
<tr>
<td>Male Hypogonadism</td>
<td>Physical exam, ROS</td>
<td>Hormonal testing (total and free testosterone, SHBG, LH/FSH, prolactin) as needed to complete diagnosis.</td>
</tr>
<tr>
<td>Obstructive Sleep Apnea</td>
<td>Physical exam, neck circumference, ROS</td>
<td>Polysomnography needed to complete diagnosis.</td>
</tr>
<tr>
<td>Asthma / Respiratory Disease</td>
<td>Physical exam, ROS</td>
<td>Chest x-ray and spirometry study may be needed to complete diagnosis.</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td>Physical exam, ROS</td>
<td>Radiographic imaging may be needed to complete diagnosis.</td>
</tr>
<tr>
<td>Urinary Stress Incontinence</td>
<td>Physical exam, ROS</td>
<td>Urine culture, urodynamic testing may be needed to complete diagnosis.</td>
</tr>
<tr>
<td>GERD</td>
<td>Physical exam, ROS</td>
<td>Endoscopy, esophageal motility study may be needed to complete diagnosis.</td>
</tr>
</tbody>
</table>

Abbreviations: GERD = gastroesophageal reflux disease; LH/FSH = ; PCOS = polycystic ovarian syndrome; ROS = review of symptoms; SHBG = sex hormone binding globulin
## Checklist of Weight-Related Complications: Screening and Diagnoses in Patients with Overweight/Obesity

### Psychological Complications

<table>
<thead>
<tr>
<th>Weight-Related Complication</th>
<th>Basis for Screening and/or Diagnosis</th>
<th>Suggested Secondary Testing When Needed To Confirm Diagnosis, Stage Severity, or Guide Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression, Anxiety, Binge Eating Disorder, Stigmatization</td>
<td>History, ROS</td>
<td>Screening/diagnostic evaluation or questionnaires based on criteria in Diagnostic and Statistical Manual of Mental Disorders; referral to clinical psychologist or psychiatrist.</td>
</tr>
</tbody>
</table>

**Abbreviations:** ROS = review of symptoms
## Diagnostic Categories

Based on BMI + screening for weight-related complications

<table>
<thead>
<tr>
<th>NORMAL WEIGHT</th>
<th>STAGE 0</th>
<th>STAGE 1</th>
<th>STAGE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>No obesity</td>
<td>No complications</td>
<td>One or more mild-to-moderate complications or may be treated effectively with moderate weight loss</td>
<td>At least one severe complication or requires more aggressive weight loss for effective treatment</td>
</tr>
<tr>
<td>BMI &lt;25</td>
<td>BMI 25–29.9 OVERWEIGHT</td>
<td>BMI ≥30 OBESITY</td>
<td>BMI ≥25</td>
</tr>
<tr>
<td>&lt;23 in certain ethnicities</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
AACE/ACE ALGORITHM FOR THE MEDICAL CARE OF PATIENTS WITH OBESITY

ALGORITHM COMPONENTS

1. Obesity Screening
2. Diagnosis
3. Treatment: Goals and Considerations
4. Follow-Up
### Phases of Chronic Disease Prevention and Treatment Goals

<table>
<thead>
<tr>
<th>PRIMARY</th>
<th>SECONDARY</th>
<th>TERTIARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevent overweight / obesity</td>
<td>Prevent progressive weight gain or achieve weight loss to prevent complications</td>
<td>Achieve weight loss sufficient to ameliorate the complications and prevent further deterioration</td>
</tr>
</tbody>
</table>

#### Stages

- **Stage 0**
  - Normal Weight

- **Stage 1**
  - Prevent progressive weight gain or achieve weight loss to prevent complications

- **Stage 2**
  - Achieve weight loss sufficient to ameliorate the complications and prevent further deterioration
### Treatment Based on Clinical Judgment

<table>
<thead>
<tr>
<th>PRIMARY</th>
<th>SECONDARY (STAGE 0)</th>
<th>TERTIARY (STAGE 1)</th>
<th>TERTIARY (STAGE 2)</th>
</tr>
</thead>
</table>
| • Healthy meal plan  
  • Physical activity  
  • Health education  
  • Built environment | • Lifestyle/behavioral therapy  
  • Consider pharmacotherapy if lifestyle alone not effective | • Lifestyle/behavioral therapy  
  • Consider pharmacotherapy (BMI ≥27) | • Lifestyle/behavioral therapy  
  • Add pharmacotherapy (BMI ≥27)  
  • Consider bariatric surgery (BMI ≥35) |
### Treatment Based on Clinical Judgment

#### Treatment Goals Based on Diagnosis in the Medical Management of Patients with Obesity

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Treatment Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthropometric</td>
<td>Clinical Goals</td>
</tr>
<tr>
<td>Component</td>
<td>Intervention/Weight-Loss Goal</td>
</tr>
<tr>
<td>Clinical Component</td>
<td></td>
</tr>
</tbody>
</table>

#### Primary Prevention

<table>
<thead>
<tr>
<th></th>
<th>Diagnosis</th>
<th>Treatment Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primordial Prevention</strong></td>
<td>BMI ≤25 (≤23 in certain ethnicities)</td>
<td>Obesogenic environment • Public education • Built environment • Access to healthy foods</td>
</tr>
<tr>
<td><strong>Primary Prevention</strong></td>
<td>BMI ≤25 (≤23 in certain ethnicities)</td>
<td>High-risk individuals or subgroups based on individual or cultural behaviors, ethnicity, family history, biomarkers, or genetics</td>
</tr>
</tbody>
</table>
### Treatment Based on Clinical Judgment

#### AACE/ACE Algorithm for the Medical Care of Patients with Obesity

**Treatment Goals Based on Diagnosis in the Medical Management of Patients with Obesity**

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Anthropometric Component</th>
<th>Clinical Component</th>
<th>Intervention/Weight-Loss Goal</th>
<th>Clinical Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Secondary Prevention (Stage 0)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>BMI 25–29.9 (BMI 23–24.9 in certain ethnicities)</td>
<td>No clinically significant or detectable weight-related complications</td>
<td>• Prevent progressive weight gain or • Weight loss</td>
<td>• Prevent progression to obesity • Prevent the development of weight-related complications</td>
</tr>
<tr>
<td>Obesity</td>
<td>BMI ≥30 (≥25 in certain ethnicities)</td>
<td>No clinically significant or detectable weight-related complications</td>
<td>• Weight loss or • Prevent progressive weight gain</td>
<td>Prevent the development of weight-related complications</td>
</tr>
</tbody>
</table>
### Treatment Based on Clinical Judgment

#### TREATMENT GOALS BASED ON DIAGNOSIS IN THE MEDICAL MANAGEMENT OF PATIENTS WITH OBESITY

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Tertiary Prevention (Stage 1 or 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anthropometric Component</strong></td>
<td></td>
</tr>
<tr>
<td>Overweight or Obesity</td>
<td>BMI ≥25 (≥23 in certain ethnicities)</td>
</tr>
<tr>
<td>Prediabetes</td>
<td>10%</td>
</tr>
<tr>
<td>T2D</td>
<td>5% to ≥15%</td>
</tr>
<tr>
<td>Nonalcoholic fatty liver disease</td>
<td></td>
</tr>
<tr>
<td>Steatosis</td>
<td>5% or more</td>
</tr>
<tr>
<td>Steatohepatitis</td>
<td>10% to 40%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Clinical Component</strong></th>
<th><strong>Intervention/Weight-Loss Goal</strong></th>
<th><strong>Clinical Goals</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Metabolic syndrome</td>
<td>10%</td>
<td>Prevention of T2D</td>
</tr>
<tr>
<td>Prediabetes</td>
<td>10%</td>
<td>Prevention of T2D</td>
</tr>
<tr>
<td>T2D</td>
<td>5% to ≥15%</td>
<td>Reduction in A1C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduction in number and/or doses of glucose lowering medications</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diabetes remission especially when diabetes duration is short</td>
</tr>
<tr>
<td>Steatosis</td>
<td>5% or more</td>
<td>Reduction in intrahepatocellular lipid</td>
</tr>
<tr>
<td>Steatohepatitis</td>
<td>10% to 40%</td>
<td>Reduction in inflammation and fibrosis</td>
</tr>
</tbody>
</table>
# Treatment Based on Clinical Judgment

## TREATMENT GOALS BASED ON DIAGNOSIS IN THE MEDICAL MANAGEMENT OF PATIENTS WITH OBESITY

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Anthropometric Component</th>
<th>Clinical Component</th>
<th>Intervention/Weight-Loss Goal</th>
<th>Clinical Goals</th>
</tr>
</thead>
</table>
| **Overweight or Obesity** | BMI ≥25 (≥23 in certain ethnicities) | Dyslipidemia | 5% to ≥15% | • Lower triglycerides  
• Raise HDL-c  
• Lower non-HDL-c |
| | | Hypertension | 5% to ≥15% | • Lower systolic and diastolic BP  
• Reductions in number and/or doses of antihypertensive medications |
## Treatment Based on Clinical Judgment

### Abbreviations

- A1c = hemoglobin A1c
- BMI = body mass index
- BP = blood pressure
- HDL-C = high-density lipoprotein cholesterol
- T2DM = type 2 diabetes mellitus

### TREATMENT GOALS BASED ON DIAGNOSIS IN THE MEDICAL MANAGEMENT OF PATIENTS WITH OBESITY

<table>
<thead>
<tr>
<th>DIAGNOSIS</th>
<th>TREATMENT GOALS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anthropometric Component</strong></td>
<td><strong>Clinical Component</strong></td>
</tr>
<tr>
<td><strong>Intervention/Weight-Loss Goal</strong></td>
<td><strong>Clinical Goals</strong></td>
</tr>
<tr>
<td><strong>TERTIARY PREVENTION (STAGE 1 OR 2)</strong></td>
<td></td>
</tr>
<tr>
<td>Overweight or Obesity - BMI ≥25 (≥23 in certain ethnicities)</td>
<td>Polycystic ovary syndrome</td>
</tr>
<tr>
<td></td>
<td>• Ovulation</td>
</tr>
<tr>
<td></td>
<td>• Regularization of menses</td>
</tr>
<tr>
<td></td>
<td>• Reduced hirsuitism</td>
</tr>
<tr>
<td></td>
<td>• Enhanced insulin sensitivity</td>
</tr>
<tr>
<td></td>
<td>• Reduced serum androgen levels</td>
</tr>
<tr>
<td>Female infertility - 10% or more</td>
<td>Male hypogonadism</td>
</tr>
<tr>
<td></td>
<td>• Ovulation</td>
</tr>
<tr>
<td></td>
<td>• Pregnancy and live birth</td>
</tr>
<tr>
<td>Obstructive sleep apnea - 7% to 11% or more</td>
<td>Asthma/reactive airway disease</td>
</tr>
<tr>
<td></td>
<td>• Improved symptomatology</td>
</tr>
<tr>
<td></td>
<td>• Decreased apnea-hypopnea index</td>
</tr>
<tr>
<td>Asthma/reactive airway disease - 7% to 8% or more</td>
<td>Osteoarthritis</td>
</tr>
<tr>
<td></td>
<td>• ≥10%</td>
</tr>
<tr>
<td></td>
<td>• 5% to 10% or more when coupled with exercise</td>
</tr>
<tr>
<td>Osteoarthritis - ≥10%</td>
<td>Urinary stress incontinence - 5% to 10% or more</td>
</tr>
<tr>
<td></td>
<td>Gastroesophageal reflux disease - 10% or more</td>
</tr>
<tr>
<td>Depression - Uncertain</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: A1C = hemoglobin A1c; BMI = body mass index; BP = blood pressure; HDL-C = high-density lipoprotein cholesterol; T2DM = type 2 diabetes mellitus.
### Treatment Based on Clinical Judgment

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

<table>
<thead>
<tr>
<th>MEAL PLAN</th>
<th>PHYSICAL ACTIVITY</th>
<th>BEHAVIOR</th>
</tr>
</thead>
</table>
| - 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 | - 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 | An interventional package that includes any number of the following:  
- 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 |

Team member or expertise: dietitian, health educator  

Team member or expertise: exercise trainer, physical activity coach, physical/occupational therapist  

Team member or expertise: health educator, behaviorist, clinical psychologist, psychiatrist
Treatment Based on Clinical Judgment

When to Initiate Weight-Loss Medications in Patients with Overweight/Obesity

Initiate Lifestyle Therapy

1. No Complications.
   Patients with overweight or obesity who have no clinically significant weight-related complications (secondary prevention)

2. Mild to Moderate Complications.
   • Patients with mild to moderate weight-related complications when lifestyle therapy is anticipated to achieve sufficient weight loss to ameliorate the complication (tertiary prevention)
   • Note: weight loss medications may also be indicated based on clinical judgment

Initiate Weight Loss Medication as an Adjunct to Lifestyle Therapy

1. Failure on Lifestyle Therapy.
   Add medication for patients who have progressive weight gain or who have not achieved clinical improvement in weight-related complications on lifestyle therapy alone.

2. Weight Regain on Lifestyle Therapy.
   Add medication for patients with overweight (BMI 27–29.9 kg/m²) or obesity who are experiencing weight regain following initial success on lifestyle therapy alone.

3. Presence of Weight-Related Complications.
   Initiate medication concurrent with lifestyle therapy for patients with overweight (BMI 27–29.9 kg/m²) or obesity who have weight-related complications, particularly if severe, in order to achieve sufficient weight loss to ameliorate the complication (tertiary prevention).
Treatment Based on Clinical Judgment

WEIGHT-LOSS MEDICATIONS:

PREFERRED MEDICATIONS: INDIVIDUALIZATION OF THERAPY

MEDICATIONS APPROVED BY THE FDA FOR LONG-TERM TREATMENT OF OBESITY
### PREFERRED WEIGHT-LOSS MEDICATIONS: INDIVIDUALIZATION OF THERAPY

<table>
<thead>
<tr>
<th>CLINICAL CHARACTERISTICS OR COEXISTING DISEASES</th>
<th>Orlistat</th>
<th>Lorcaserin</th>
<th>Phentermine/topiramate ER</th>
<th>Naltrexone ER/bupropion ER</th>
<th>Liraglutide 3 mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes Prevention (metabolic syndrome, prediabetes)</td>
<td>Insufficient data for T2DM prevention</td>
<td>Insufficient data for T2DM prevention</td>
<td>Monitor heart rate</td>
<td>Monitor BP and heart rate.</td>
<td>Monitor heart rate</td>
</tr>
<tr>
<td>Type 2 Diabetes Mellitus</td>
<td>Monitor heart rate</td>
<td>Monitor heart rate</td>
<td>Monitor heart rate</td>
<td>Monitor heart rate</td>
<td>Monitor heart rate</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Monitor heart rate</td>
<td>Monitor for bradycardia</td>
<td>Monitor heart rate, rhythm</td>
<td>Monitor heart rate, rhythm, BP</td>
<td>Monitor heart rate, rhythm</td>
</tr>
<tr>
<td>Cardiovascular Disease</td>
<td>Monitor heart rate</td>
<td>Monitor for bradycardia</td>
<td>Monitor heart rate, rhythm</td>
<td>Monitor heart rate, rhythm</td>
<td>Monitor heart rate, rhythm</td>
</tr>
<tr>
<td>CAD</td>
<td>Monitor heart rate</td>
<td>Monitor for bradycardia</td>
<td>Monitor heart rate, rhythm</td>
<td>Monitor heart rate, rhythm</td>
<td>Monitor heart rate, rhythm</td>
</tr>
<tr>
<td>Arrhythmia</td>
<td>Monitor heart rate</td>
<td>Monitor for bradycardia</td>
<td>Monitor heart rate, rhythm</td>
<td>Monitor heart rate, rhythm</td>
<td>Monitor heart rate, rhythm</td>
</tr>
<tr>
<td>CHF</td>
<td>Insufficient data</td>
<td>Insufficient data</td>
<td>Insufficient data</td>
<td>Insufficient data</td>
<td>Insufficient data</td>
</tr>
<tr>
<td>Chronic Kidney Disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild (50–79 mL/min)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate (30–49 mL/min)</td>
<td></td>
<td></td>
<td>Do not exceed 7.5 mg/46 mg per day</td>
<td>Do not exceed 8 mg/90 mg bid</td>
<td></td>
</tr>
<tr>
<td>Severe (&lt;30 mL/min)</td>
<td>Watch for oxalate nephropathy</td>
<td>Urinary clearance of drug metabolites</td>
<td>Urinary clearance of drug</td>
<td>Urinary clearance of drug</td>
<td>Avoid vomiting and volume depletion</td>
</tr>
</tbody>
</table>

**KEY:**
- **PREFERRED DRUG**
- **USE WITH CAUTION**
- **AVOID**

*Use medications only with clear health-related goals in mind; assess patient for osteoporosis and sarcopenia.

**Abbreviations:** BP = blood pressure; CAD = coronary artery disease; CHF = congestive heart failure; HTN = hypertension; T2DM = Type 2 Diabetes Mellitus.
# Preferred Weight-Loss Medications: Individualization of Therapy

## Clinical Characteristics or Coexisting Diseases

<table>
<thead>
<tr>
<th>Medications for Chronic Weight Management</th>
<th>Orlistat</th>
<th>Lorcaserin</th>
<th>Phentermine/Topiramate ER</th>
<th>Naltrexone ER/Bupropion ER</th>
<th>Liraglutide 3 mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nephrolithiasis</td>
<td>Calcium oxalate stones</td>
<td>Calcium phosphate stones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatic Impairment</td>
<td>Watch for cholelithias</td>
<td>Hepatic metabolism of drug</td>
<td>Do not exceed 7.5 mg/46 mg per day</td>
<td>Do not exceed 8 mg/90 mg in AM</td>
<td>Watch for cholelithias</td>
</tr>
<tr>
<td>Severe (Child-Pugh &gt;9)</td>
<td>Not recommended</td>
<td>Not recommended</td>
<td>Not recommended</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Depression</td>
<td>Insufficient safety data</td>
<td>Avoid maximum dose: 15 mg/92 mg per day</td>
<td>Insufficient safety data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>Avoid max dose: 15 mg/92 mg per day</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychoses</td>
<td>Insufficient data</td>
<td>Insufficient data</td>
<td>Insufficient data</td>
<td>Insufficient data</td>
<td>Insufficient data</td>
</tr>
<tr>
<td>Binge Eating Disorder</td>
<td>Insufficient data. Possible benefit based on reduction in food cravings</td>
<td>Insufficient data. Possible benefit based on studies with topiramate</td>
<td>Insufficient data. Possible benefit based on studies with bupropion</td>
<td>Insufficient data. Possible benefit based on studies with bupropion</td>
<td>Insufficient data</td>
</tr>
</tbody>
</table>

**KEY: PREFERRED DRUG -- USE WITH CAUTION -- AVOID**

*Use medications only with clear health-related goals in mind; assess patient for osteoporosis and sarcopenia.*
<table>
<thead>
<tr>
<th>CLINICAL CHARACTERISTICS OR COEXISTING DISEASES</th>
<th>ORLISTAT</th>
<th>LОРCASERIN</th>
<th>PHENTERMINE/TOPIRAMATE ER</th>
<th>NALTREXONE ER/BUPROPION ER</th>
<th>LIRAGLU意识形态 3 mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glaucoma</td>
<td></td>
<td></td>
<td>Contraindicated, may trigger angle closure</td>
<td>May trigger angle closure</td>
<td></td>
</tr>
<tr>
<td>Seizure Disorder</td>
<td></td>
<td></td>
<td>If discontinue at dose of 15 mg/92 mg, taper slowly</td>
<td>Bupropion lowers seizure threshold</td>
<td></td>
</tr>
<tr>
<td>Pancreatitis</td>
<td>Monitor for symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seizure Disorder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opioid Use</td>
<td></td>
<td></td>
<td></td>
<td>Will antagonize opioids and opiates</td>
<td></td>
</tr>
<tr>
<td>Women of Reproductive Potential</td>
<td>Use contraception and discontinue orlistat should pregnancy occur</td>
<td>Use contraception and discontinue lorcaserin should pregnancy occur</td>
<td>Use contraception and discontinue phentermine/topiramate should pregnancy occur (perform monthly pregnancy checks to identify early pregnancy)</td>
<td>Use contraception and discontinue naltrexone ER/bupropion ER should pregnancy occur</td>
<td>Use contraception and discontinue liraglutide 3mg should pregnancy occur</td>
</tr>
<tr>
<td>Pregnancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast-feeding</td>
<td>Not recommended</td>
<td>Not recommended</td>
<td>Not recommended</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Age ≥65 years</td>
<td>Limited data available</td>
<td>Insufficient data</td>
<td>Limited data available</td>
<td>Insufficient data</td>
<td>Limited data available</td>
</tr>
<tr>
<td>Alcoholism/Addiction</td>
<td></td>
<td></td>
<td>Might have abuse potential due to euphoria at high doses</td>
<td>Insufficient data. Topiramate might exert therapeutic benefits</td>
<td>Avoid due to seizure risk and lower seizure threshold on bupropion</td>
</tr>
<tr>
<td>Post-Bariatric Surgery</td>
<td>Insufficient data</td>
<td>Insufficient data</td>
<td>Limited data available</td>
<td>Insufficient data</td>
<td>Data available at 1.8 – 3.0 mg/day</td>
</tr>
</tbody>
</table>

**KEY:**
- **PREFERRED DRUG**
- **USE WITH CAUTION**
- **AVOID**

* Use medications only with clear health-related goals in mind; assess patient for osteoporosis and sarcopenia.
## Weight-Loss Medications Approved by the FDA for Long-Term Treatment of Obesity

### Orlistat

**Mechanism of Action, Study Name, Study Duration:**
- Lipase inhibitor
- XENDOS
- 1 yr: 4.0%
- 4 yr: 2.6%

**Dose:**
- 120 mg PO TID (before meals)
- OTC: 60 mg PO TID (before meals)

**Common Side Effects:**
- Steatorrhea
- Fecal urgency
- Incontinence
- Flatulence
- Oily spotting
- Frequent bowel movements
- Abdominal pain
- Headache

**Contraindications, Cautions, and Safety Concerns:**
- Pregnancy and breastfeeding
- Chronic malabsorption syndrome
- Cholestasis
- Oxalate nephrolithiasis
- Rare severe liver injury
- Cholelithiasis
- Malabsorption of fat-soluble vitamins
- Effects on other medications:
  - Warfarin (enhance)
  - Antiepileptics (decrease)
  - Levothyroxine (decrease)
  - Cyclosporine (decrease)

**Monitoring and Comments:**
- Monitor for:
  - Cholelithiasis
  - Nephrolithiasis
- Recommend standard multivitamin (to include vitamins A, D, E, and K) at bedtime or 2 hours after orlistat dose
- Eating >30% kcal from fat results in greater GI side effects
- FDA-approved for children ≥12 years old
- Administer levothyroxine and orlistat 4 hours apart

**Monitoring and Comments**
- Warfarin (enhance)
- Antiepileptics (decrease)
- Levothyroxine (decrease)
- Cyclosporine (decrease)
<table>
<thead>
<tr>
<th>Mechanism of Action, Study Name, Study Duration: % TBWL Greater Than Placebo</th>
<th>Dose</th>
<th>Common Side Effects</th>
<th>Contraindications, Cautions, and Safety Concerns</th>
<th>Monitoring and Comments</th>
</tr>
</thead>
</table>
| Serotonin (5HT2c) receptor agonist | 10 mg PO BID | • Headache  
• Nausea  
• Dizziness  
• Fatigue  
• Xerostomia  
• Dry eye  
• Constipation  
• Diarrhea  
• Back pain  
• Nasopharyngitis  
• Hyperprolactinemia | ✓ Pregnancy and breastfeeding  
✓ Serotonin syndrome or neuroleptic malignant syndrome  
• Safety data lacking in patients who have depression  
• Concomitant use of SSRI, SNRI, MAOI, bupropion, St. John’s wort as may increase risk of developing serotonin syndrome  
• Uncontrolled mood disorder  
• Cognitive impairment  
• Avoid in patients with severe liver injury or renal insufficiency  
• Caution with patients with bradycardia, heart block, or heart failure  
• Unproven concern for potential cardiac valvulopathy  
• Leukopenia | Monitor for:  
• Symptoms of cardiac valve disease  
• Bradycardia  
• Serotonin syndrome  
• Neuroleptic malignant syndrome  
• Depression  
• Severe mood alteration, euphoria, dissociative state  
• Confusion/somnolence  
• Priapism  
• Leukopenia  
• Euphoria at high doses could predispose to abuse  
• Hypoglycemia in patients having T2DM treated with insulin and/or sulfonylureas |

**LORCASERIN**  
(Belviq®) | 2012
# Weight-Loss Medications Approved by the FDA for Long-Term Treatment of Obesity

**Phentermine / Topiramate ER**  
*(Qsymia®) | 2012*

<table>
<thead>
<tr>
<th>Mechanism of Action, Study Name, Study Duration: % TBWL Greater Than Placebo</th>
<th>Dose</th>
<th>Common Side Effects</th>
<th>Contraindications, Cautions, and Safety Concerns</th>
<th>Monitoring and Comments</th>
</tr>
</thead>
</table>
| NE-releasing agent (phentermine) | **Starting dose:** 3.75/23 mg PO QD for 2 weeks | • Headache  
• Paresthesia  
• Insomnia  
• Decreased bicarbonate  
• Xerostomia  
• Constipation  
• Nasopharyngitis  
• Anxiety  
• Depression  
• Cognitive impairment (concentration and memory)  
• Dizziness  
• Nausea  
• Dysgeusia | ✓ Pregnancy and breastfeeding (topiramate teratogenicity)  
✓ Hyperthyroidism  
✓ Acute angle-closure glaucoma  
✓ Concomitant MAOI use (within 14 days)  
• Tachyarrhythmias  
• Decreased cognition  
• Seizure disorder  
• Anxiety and panic attacks  
• Nephrolithiasis  
• Hypercholestermic metabolic acidosis  
• Dose adjustment with hepatic and renal impairment  
• Concern for abuse potential  
• Combined use with alcohol or depressant drugs can worsen cognitive impairment | Monitor for:  
• Increased heart rate  
• Depressive symptomatology or worsening depression especially on maximum dose  
• Hypokalemia (especially with HCTZ or furosemide)  
• Acute myopia and/or ocular pain  
• Acute kidney stone formation  
• Hypoglycemia in patients having T2DM treated with insulin and/or sulfonylureas - Potential for lactic acidosis (hyperchloremic non-anion gap) in combination with metformin  
- MAOI (allow ≥14 days between discontinuation)  
- 15 mg/92 mg dose should not be discontinued abruptly (increased risk of seizure); taper over at least 1 week  
- Health care professional should check ßHCG before initiating, followed by monthly self-testing at home  
- Monitor electrolytes and creatinine before and during treatment  
- Can cause menstrual spotting in women taking birth control pills due to altered metabolism of estrogen and progestins |
| GABA receptor modulation (topiramate) | **Recommended dose:** 7.5/46 mg PO QD | | ✓ Contraindication  
• Warning, Safety Concern | |
| **EQUIP**  
**CONQUER**  
**SEQUEL** | **Escalation dose:** 11.25/69 mg PO QD | | | |
| 1 yr: 8.6%-9.3% on high dose; 6.6% on treatment dose | **Maximum dose:** 15/92 mg PO QD | | | |
| 2 yr: 8.7% on high dose; 7.5% on treatment dose | | | | |
### WEIGHT-LOSS MEDICATIONS APPROVED BY THE FDA FOR LONG-TERM TREATMENT OF OBESITY

#### NALTREXONE ER / BUPROPION ER

*(Contrave®) | 2014*

<table>
<thead>
<tr>
<th>Mechanism of Action, Study Name, Study Duration: % TBWL Greater Than Placebo</th>
<th>Dose</th>
<th>Common Side Effects</th>
<th>Contraindications, Cautions, and Safety Concerns</th>
<th>Monitoring and Comments</th>
</tr>
</thead>
</table>
| Opiate antagonist (naltrexone)  
Reuptake inhibitor of DA and NE (bupropion)  
COR-I  
COR-II  
COR-BMOD  
1 yr: 4.2%-5.2% | **Titrate dose:**  
**Week 1:** 1 tab (8/90 mg) PO QAM  
**Week 2:** 1 tab (8/90 mg) PO BID  
**Week 3:** 2 tabs (total 16/180 mg) PO QAM and 1 tab (8/90 mg) PO QHS  
**Week 4:** 2 tabs (total 16/180 mg) PO QHS | • Nausea  
• Headache  
• Insomnia  
• Vomiting  
• Constipation  
• Diarrhea  
• Dizziness  
• Anxiety  
• Xerostomia | ✓ Pregnancy and breastfeeding  
✓ Uncontrolled hypertension  
✓ Seizure disorder  
✓ Anorexia nervosa  
✓ Bulimia nervosa  
✓ Severe depression  
✓ Drug or alcohol withdrawal  
✓ Concomitant MAOI (within 14 days)  
✓ Chronic opioid use | Monitor for:  
• Increased heart rate and blood pressure  
• Worsening depression and suicidal ideation  
• Worsening of migraines  
• Liver injury (naltrexone)  
• Hypoglycemia in patients having T2DM treated with insulin and/or sulfonylureas  
• Seizures (bupropion lowers seizure threshold)  
- MAOI (allow ≥14 days between discontinuation)  
- Dose adjustment for patients with renal and hepatic impairment  
- Avoid taking medication with a high-fat meal  
- Can cause false positive urine test for amphetamine  
- Bupropion inhibits CYP2D6 |
## LIRAGLUTIDE 3 MG
(Saxenda®) | 2014

<table>
<thead>
<tr>
<th>Mechanism of Action, Study Name, Study Duration: % TBWL Greater Than Placebo</th>
<th>Dose</th>
<th>Common Side Effects</th>
<th>Contraindications, Cautions, and Safety Concerns</th>
<th>Monitoring and Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLP-1 analog</td>
<td>Titrate dose weekly by 0.6 mg as tolerated by patient (side effects): 0.6 mg SC QD→ 1.2 mg SC QD→ 1.8 mg SC QD→ 2.4 mg SC QD→ 3.0 mg SC QD</td>
<td>• Nausea  • Vomiting  • Diarrhea  • Constipation  • Headache  • Dyspepsia  • Increased heart rate</td>
<td>✓ Pregnancy and breastfeeding  ✓ Personal or family history of medullary thyroid cancer or MEN2  ✓ Pancreatitis  ✓ Acute gallbladder disease  • Gastroparesis  • Severe renal impairment can result from vomiting and dehydration  • Use caution in patients with history of pancreatitis  • Use caution in patients with cholelithiasis  • Suicidal ideation and behavior  • Injection site reactions</td>
<td>Monitor for:  • Pancreatitis  • Cholelithiasis and Cholecystitis  • Hypoglycemia in patients having T2DM treated with insulin and/or sulfonylureas  • Increased heart rate  • Dehydration from nausea/vomiting  • Injection site reactions</td>
</tr>
</tbody>
</table>

- Titrate dose based on tolerability (nausea and GI side effects)
**Abbreviations:**
- BID = twice daily;
- DA = dopamine;
- FDA = US Food and Drug Administration;
- GI = gastrointestinal;
- HCTZ = hydrochlorothiazide;
- MAOI = monoxidase inhibitor;
- MEN2 = multiple endocrine neoplasia type 2;
- NE = norepinephrine;
- OTC = over-the-counter medication;
- % TBWL = percent total body weight loss from baseline over that observed in the placebo group;
- PO = oral;
- QAM = every morning;
- QD = daily;
- QHS = every bedtime;
- SC = subcutaneous;
- SNRI = serotonin–norepinephrine reuptake inhibitor;
- SSRI = selective serotonin reuptake inhibitor;
- TID = 3 times a day;
- T2DM = type 2 diabetes mellitus.

**FDA indication for all medications:**
BMI >30 kg/m² or BMI ≥27kg/m² with significant comorbidity.

**After 3 to 4 months of treatment with antiobesity medication:**

- **For naltrexone ER/bupropion ER and lorcaserin:**
  If the patient has not lost at least 5% of their baseline body weight at 12 weeks on the maintenance dose, the medication should be discontinued.

- **For phentermine/topiramate ER:**
  Continue medication if the patient has lost >5% body weight after 12 weeks on recommended dose (7.5 mg/42 mg); if the patient has not lost at least 3% of body weight after being on the recommended dose for 12 weeks then the medication should be discontinued, or the patient can be transitioned to maximum dose (15 mg/92 mg); if patient has not lost at least 5% after 12 additional weeks on the maximum dose, the medication should be discontinued.

- **For liraglutide 3 mg:**
  If the patient has not lost at least 4% of body weight 16 weeks after initiation, the medication should be discontinued.

**References:**
1–4 and package inserts for each medication

ALGORITHM COMPONENTS

1. Obesity Screening
2. Diagnosis
3. Treatment: Goals and Considerations
4. Follow-Up
Follow-Up

1. Once the plateau for weight loss has been achieved, re-evaluate the weight-related complications. If the complications have not been ameliorated, weight-loss therapy should be intensified or complication-specific interventions need to be employed.

2. Obesity is a chronic disease and the diagnostic categories for obesity may not be static. Therefore, patients require ongoing follow-up, re-evaluation and long-term treatment.