What Is the Disease of Obesity?

Obesity, the Chronic Disease

Chronic Disease Management as Applied to Obesity

Intervention phase	Definition and goals	Method
Primary Prevention	Prevent development of overweight and obesity	• Educate the public • Modify obesogenic built environment • Promote healthy eating and regular physical activity
Secondary Prevention	Prevent future weight gain and development of weight-related complications in patients with overweight or obesity	• Screen using BMI • Diagnose using BMI and evaluation for complications • Treat with lifestyle/behavioral interventions ± weight loss medications
Tertiary Prevention	Treat with weight-loss therapy to eliminate or ameliorate weight-related complications and prevent disease progression	• Treat with lifestyle/behavioral interventions plus weight loss medications • Consider bariatric surgery

Obesity Meets AMA Criteria for a Disease

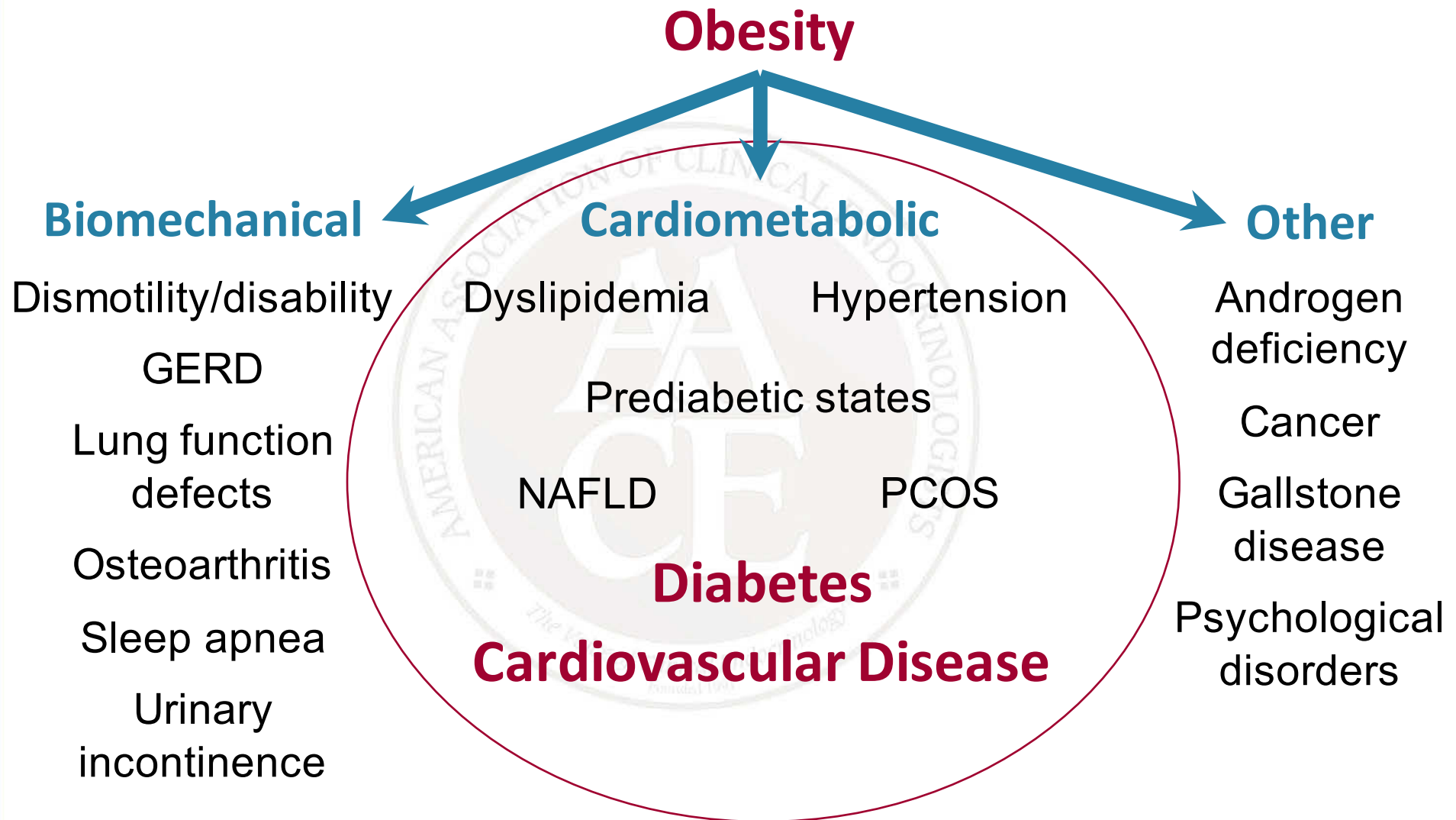| Impairment of Normal Function	Characteristic Signs or Symptoms	Harm or Morbidity
• Physical impairments • Altered physiologic function (inflammation, insulin resistance, dyslipidemia, etc) • Altered regulation of satiety in the hypothalamus	• Increased body fat mass • Joint pain • Impaired mobility • Low self-esteem • Sleep apnea • Altered metabolism	• Cardiovascular disease • Type 2 diabetes • Metabolic syndrome • Cancer • Death

AMA = American Medical Association.

Mechanick JI, et al. *Endocr Pract*. 2012;18:642-648.

Medical Complications of Obesity

Obesity

Biomechanical

Dismotility/disability

GERD

Lung function defects

Osteoarthritis

Sleep apnea

Urinary incontinence

Cardiometabolic

Dyslipidemia   Hypertension

Prediabetic states

NAFLD   PCOS

**Diabetes
Cardiovascular Disease**

Other

Androgen deficiency

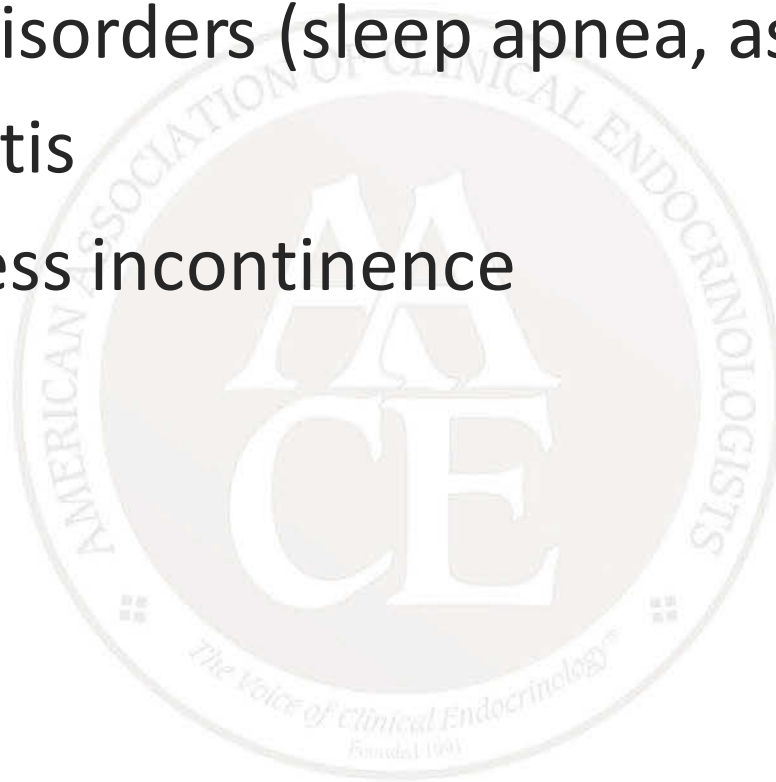Cancer

Gallstone disease

Psychological disorders

GERD = gastroesophageal reflux disease; NAFLD = nonalcoholic fatty liver disease; PCOS = polycystic ovary syndrome.

Pi-Sunyer X. *Postgrad Med*. 2009;121:21-33.

Obesity-Related Abnormalities: Mechanical Problems

- Breathing disorders (sleep apnea, asthma)
- Osteoarthritis
- Urinary stress incontinence
- GERD

GERD = gastroesophageal reflux disease.

Garvey TW, et al. *Endocr Pract*. 2016;22(suppl 3):1-205.

Obesity-Related Abnormalities: Metabolic and Organ Dysfunction

- Appetite dysregulation
- Abnormal energy balance
- Endocrine dysfunction
  - Elevated leptin levels
  - Insulin resistance
- Dysregulated adipokine signaling
- Abnormal endothelial function

- Hypertension
- Infertility
- Nonalcoholic fatty liver disease (NAFLD)
- Dyslipidemia
- Systemic inflammation
- Adipose tissue inflammation

GERD = gastroesophageal reflux disease.

Garvey TW, et al. *Endocr Pract*. 2016;22(suppl 3):1-205.

Obesity Has Multiple Pathophysiologic Origins

Bray GA, et al. *Lancet*. 2016;387:1947-1956.
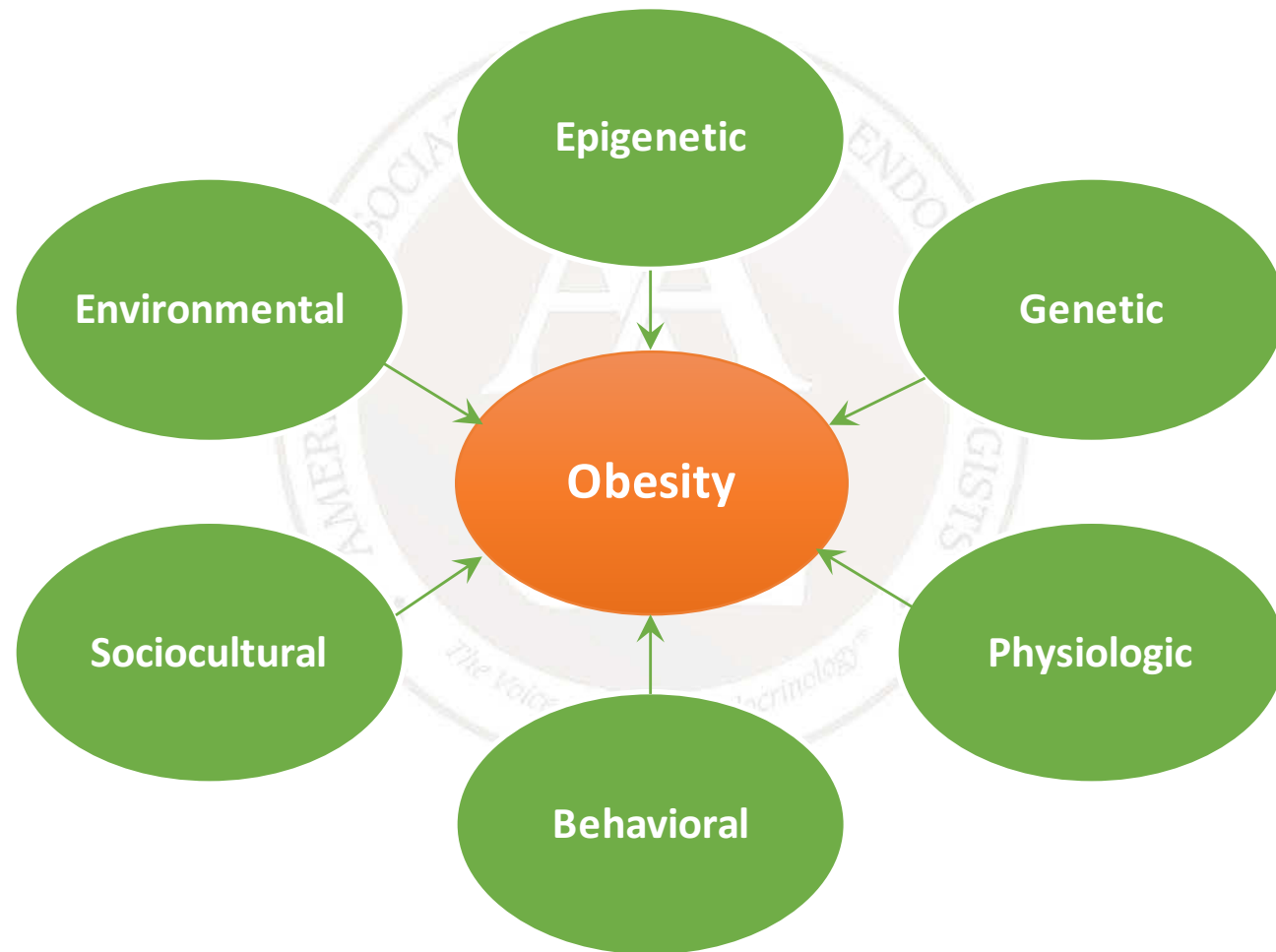
Obesity, the Chronic Disease

AACE Obesity Algorithm

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** ▶

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

ALGORITHM COMPONENTS

1. **Obesity Screening** ▶

2. **Diagnosis** ▶

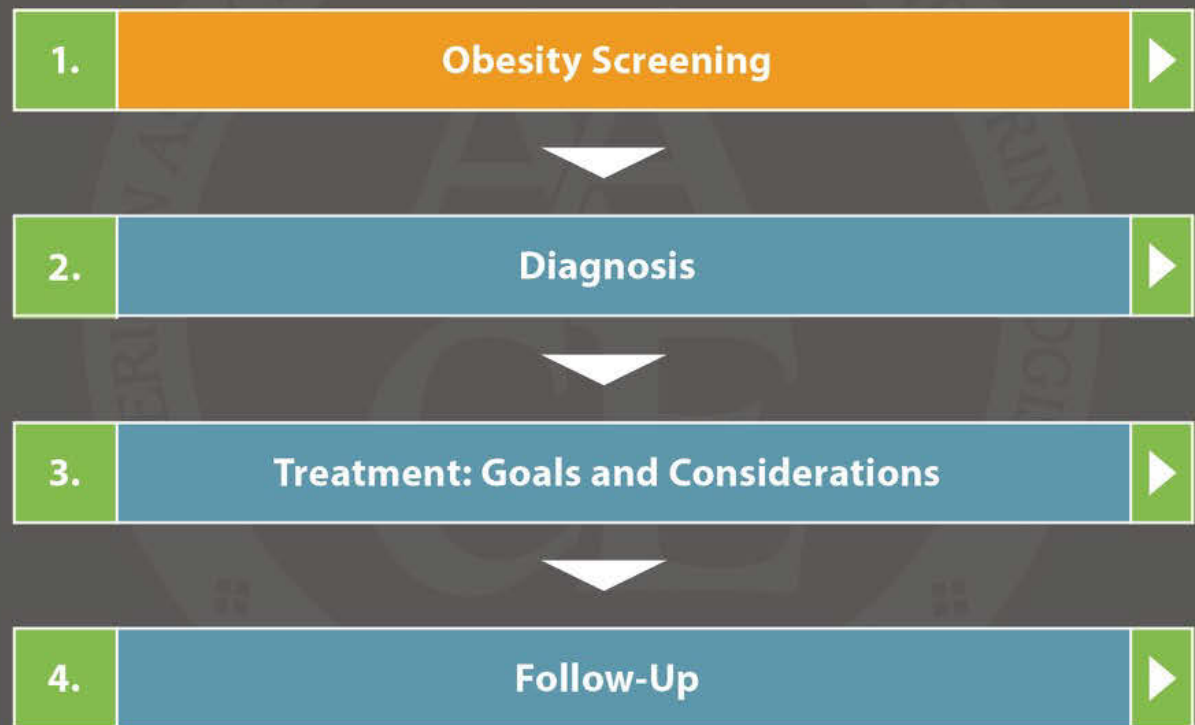3. **Treatment: Goals and Considerations** ▶

4. **Follow-Up** ▶

1. 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
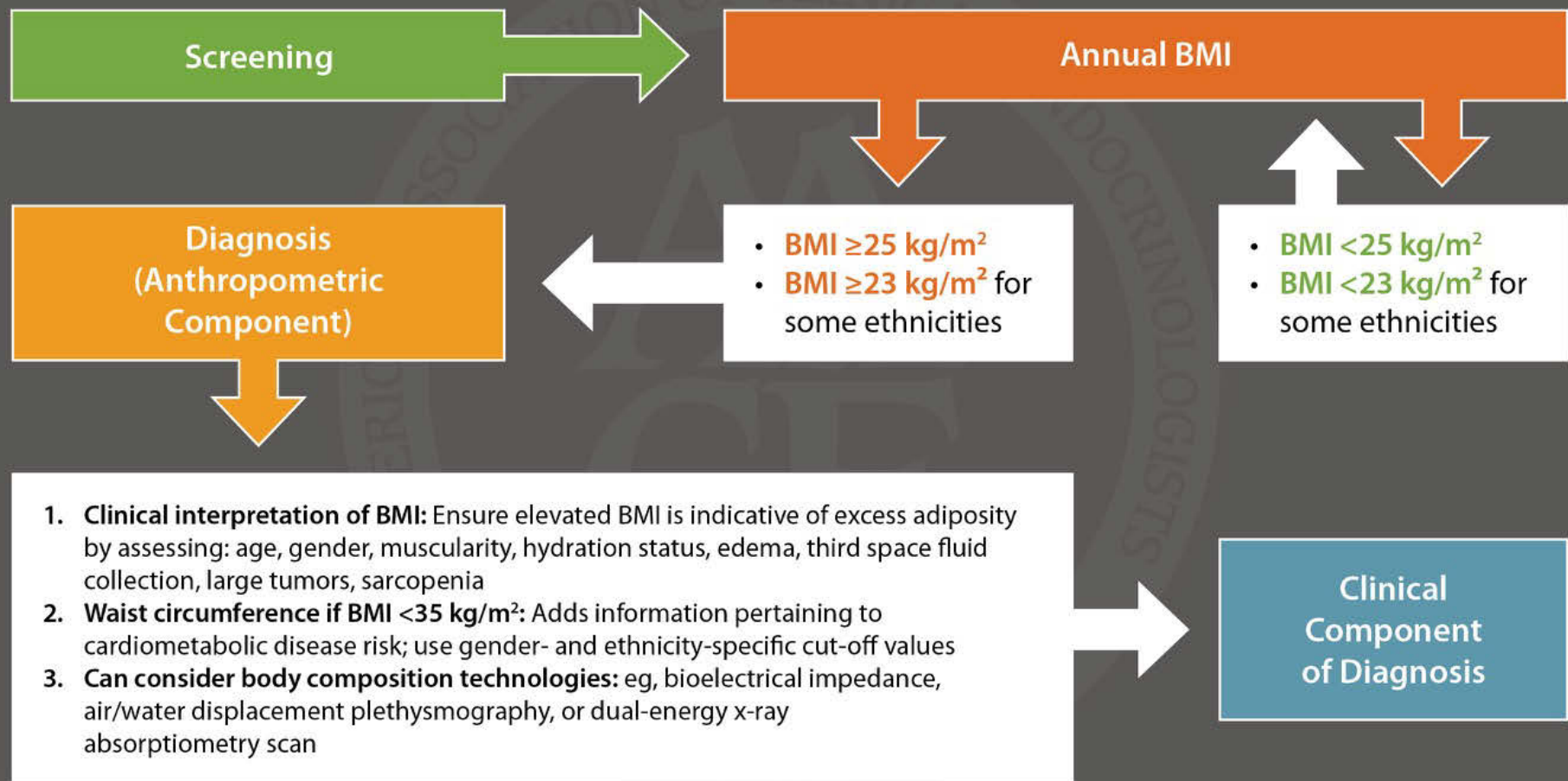
5. Obesity history: graph weight vs age, lifestyle patterns/preferences, previous interventions

2.

Diagnosis: Anthropometric Component

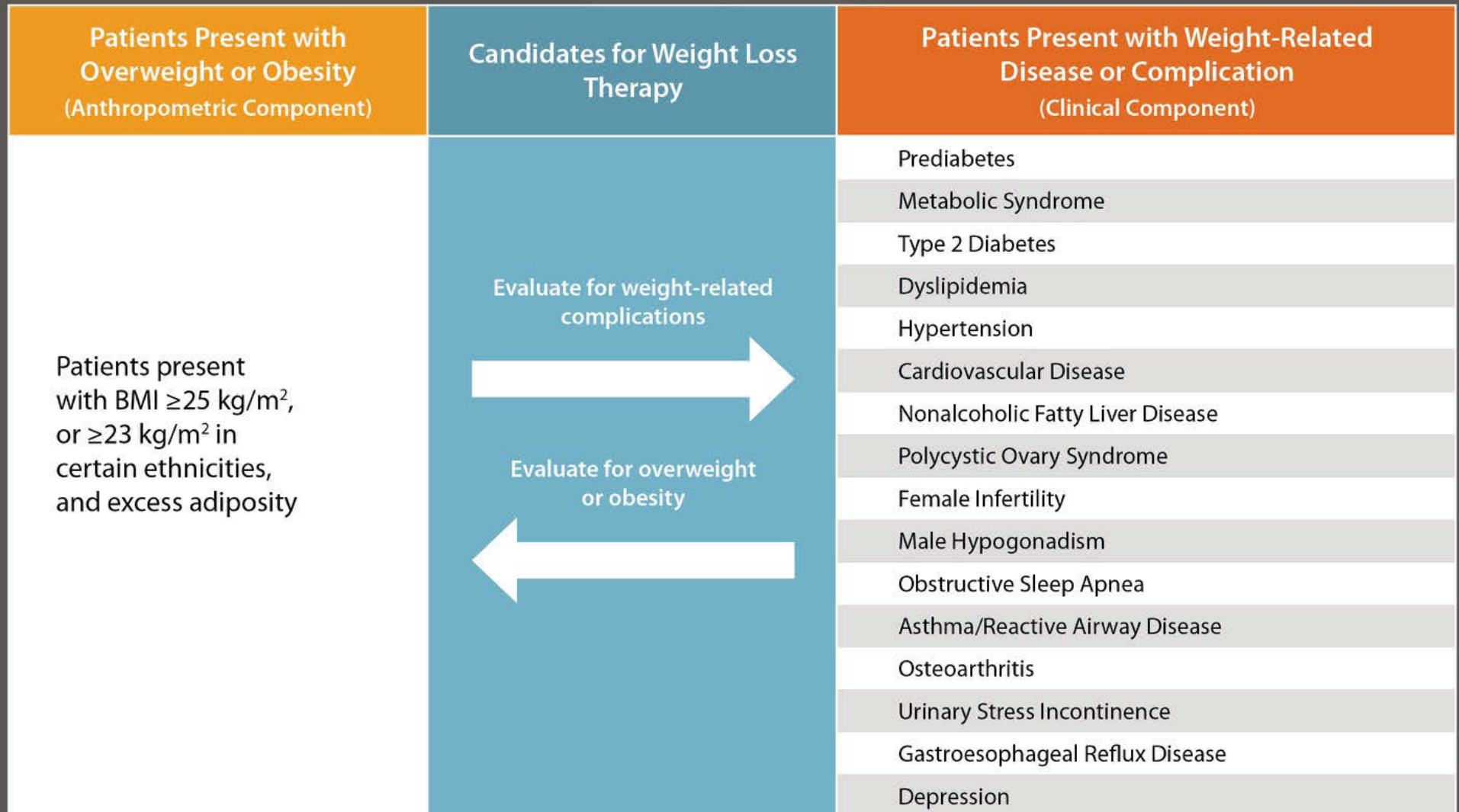## EVIDENCE-BASED SCREENING AND DIAGNOSIS FOR EXCESS ADIPOSITY IN CLINICAL SETTINGS

Screening → **Annual BMI**

Diagnosis (Anthropometric Component) ←

- BMI ≥25 kg/m²
- BMI ≥23 kg/m² for some ethnicities

- BMI <25 kg/m²
- BMI <23 kg/m² for some ethnicities

1. **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

→ **Clinical Component of Diagnosis**

Abbreviation: BMI = body mass index

2.

Diagnosis: Clinical Component

EVALUATE FOR A CHECKLIST OF WEIGHT-RELATED COMPLICATIONS

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

2.

Diagnosis: Clinical Component

CHECKLIST OF WEIGHT-RELATED COMPLICATIONS: SCREENING AND DIAGNOSES IN PATIENTS WITH OVERWEIGHT/OBESITY

Metabolic Complications

▶ Prediabetes

▶ Type 2 Diabetes

▶ Metabolic Syndrome

▶ NAFLD/NASH

Cardiovascular Complications

▶ Dyslipidemia

▶ Cardiovascular Disease

▶ Hypertension

Organ-Specific, Hormonal, and Mechanical Complications

▶ PCOS and Female Infertility

▶ Osteoarthritis

▶ Male Hypogonadism

▶ Urinary Stress Incontinence

▶ Obstructive Sleep Apnea

▶ GERD

▶ Asthma / Respiratory Disease

Psychological Complications

Depression, Anxiety, Binge Eating Disorder, Stigmatization

2.

Diagnosis: Clinical Component

CHECKLIST OF WEIGHT-RELATED COMPLICATIONS: SCREENING AND DIAGNOSES IN PATIENTS WITH OVERWEIGHT/OBESITY

Metabolic Complications

Weight-Related Complication	Basis for Screening and/or Diagnosis	Suggested Secondary Testing When Needed To Confirm Diagnosis, Stage Severity, or Guide Therapy
Prediabetes	Fasting glucose; A1C; 2-hour OGTT glucose	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.
Metabolic Syndrome	Waist circumference, blood pressure, fasting glucose, triglycerides, HDL-C	Initial evaluation completes diagnosis; OGTT to test for IGT or diabetes.
Type 2 Diabetes	Fasting glucose; A1C; 2-hour OGTT glucose; symptoms of hyperglycemia	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.
NAFLD/NASH	Physical exam; LFTs	Imaging (eg, ultrasound, MRI, elastography) and/or liver biopsy needed to complete diagnosis.

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

2.

Diagnosis: Clinical Component

CHECKLIST OF WEIGHT-RELATED COMPLICATIONS: SCREENING AND DIAGNOSES IN PATIENTS WITH OVERWEIGHT/OBESITY

Cardiovascular Complications

Weight-Related Complication	Basis for Screening and/or Diagnosis	Suggested Secondary Testing When Needed To Confirm Diagnosis, Stage Severity, or Guide Therapy
Dyslipidemia	Lipid panel (total cholesterol, HDL-C, triglycerides, LDL-C, non-HDL-C)	Lipid panel completes diagnosis; lipoprotein subclasses, Apo B-100 may further define risk.
Hypertension	Sitting blood pressure	Repeat elevated blood pressure measurements to complete diagnosis; home blood pressure or ambulatory blood pressure monitoring may help complete testing.
Cardiovascular Disease	Physical exam; ROS; history and medical records	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)).

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

2.

Diagnosis: Clinical Component

CHECKLIST OF WEIGHT-RELATED COMPLICATIONS: SCREENING AND DIAGNOSES IN PATIENTS WITH OVERWEIGHT/OBESITY

Organ-Specific, Hormonal, and Mechanical Complications

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

Abbreviations: GERD = gastroesophageal reflux disease; LH/FSG = ; PCOS = polycystic ovarian syndrome; ROS = review of symptoms; SHBG = sex hormone binding globulin

2.

Diagnosis: Clinical Component

CHECKLIST OF WEIGHT-RELATED COMPLICATIONS: SCREENING AND DIAGNOSES IN PATIENTS WITH OVERWEIGHT/OBESITY

Psychological Complications

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

Abbreviations: ROS = review of symptoms

2.

Diagnostic Categories

BASED ON BMI + SCREENING FOR WEIGHT-RELATED COMPLICATIONS

NORMAL WEIGHT	STAGE 0	STAGE 1	STAGE 2
No obesity	No complications	One or more mild-to-moderate complications or may be treated effectively with moderate weight loss	At least one severe complication or requires more aggressive weight loss for effective treatment
BMI <25 <23 IN CERTAIN ETHNICITIES	**BMI 25–29.9** OVERWEIGHT **BMI ≥30** OBESITY	**BMI ≥25**	**BMI ≥25**

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** ▶

3. Phases of Chronic Disease Prevention and Treatment Goals

NORMAL WEIGHT	STAGE 0	STAGE 1	STAGE 2

PRIMARY	SECONDARY	TERTIARY	
Prevent overweight / obesity	Prevent progressive weight gain or achieve weight loss to prevent complications	Achieve weight loss sufficient to ameliorate the complications and prevent further deterioration	

3.
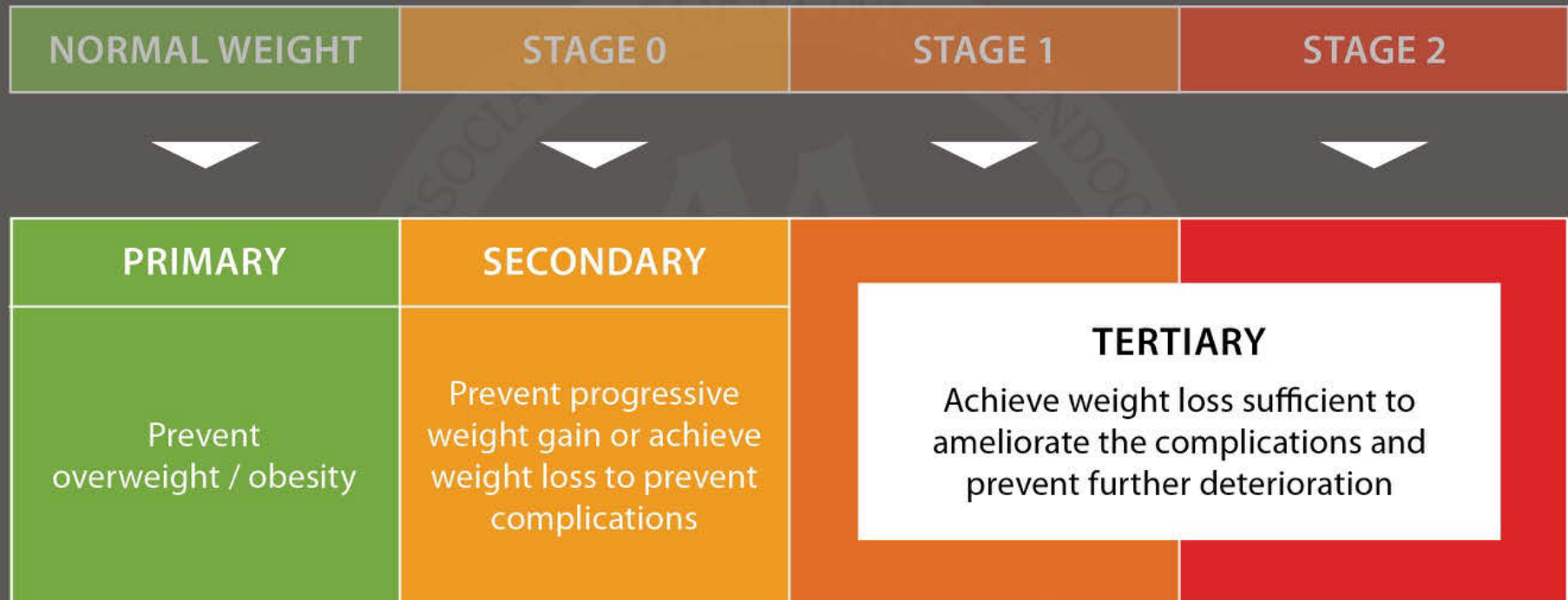
Treatment Based on Clinical Judgment

PRIMARY	SECONDARY	TERTIARY	TERTIARY
• 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)

3. Treatment Based on Clinical Judgment

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

	DIAGNOSIS		TREATMENT GOALS	
	Anthropometric Component	Clinical Component	Intervention/ Weight-Loss Goal	Clinical Goals
PRIMARY PREVENTION				
Primordial Prevention	BMI ≤25 (≤23 in certain ethnicities)	Obesogenic environment	• Public education • Built environment • Access to healthy foods	Decreased incidence of overweight/obesity in populations
Primary Prevention	BMI ≤25 (≤23 in certain ethnicities)	High-risk individuals or subgroups based on individual or cultural behaviors, ethnicity, family history, biomarkers, or genetics	• Annual BMI screening • Healthy meal plan • Increased physical activity	Decreased incidence of overweight/obesity in high-risk individuals or identifiable subgroups

3.

Treatment Based on Clinical Judgment

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

	DIAGNOSIS		TREATMENT GOALS	
	Anthropometric Component	Clinical Component	Intervention/ Weight-Loss Goal	Clinical Goals
SECONDARY PREVENTION				
Overweight	BMI 25–29.9 (BMI 23–24.9 in certain ethnicities)	No clinically significant or detectable weight-related complications	• Prevent progressive weight gain or • Weight loss	• Prevent progression to obesity • Prevent the development of weight-related complications
Obesity	BMI ≥30 (≥25 in certain ethnicities)	No clinically significant or detectable weight-related complications	• Weight loss or • Prevent progressive weight gain	Prevent the development of weight-related complications

3.

Treatment Based on Clinical Judgment

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

	DIAGNOSIS		TREATMENT GOALS	
	Anthropometric Component	Clinical Component	Intervention/ Weight-Loss Goal	Clinical Goals
TERTIARY PREVENTION				
Overweight or Obesity	BMI ≥25 (≥23 in certain ethnicities)	Metabolic syndrome	10%	Prevention of T2D
		Prediabetes	10%	Prevention of T2D
		T2D	5% to ≥15%	• Reduction in A1C • Reduction in number and/or doses of glucose lowering medications • Diabetes remission especially when diabetes duration is short
		Nonalcoholic fatty liver disease — Steatosis	5% or more	Reduction in intrahepatocellular lipid
		Nonalcoholic fatty liver disease — Steatohepatitis	10% to 40%	Reduction in inflammation and fibrosis

3.

Treatment Based on Clinical Judgment

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

	DIAGNOSIS		TREATMENT GOALS	
	Anthropometric Component	Clinical Component	Intervention/ Weight-Loss Goal	Clinical Goals
TERTIARY PREVENTION				
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

3.

Treatment Based on Clinical Judgment

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

	DIAGNOSIS		TREATMENT GOALS	
	Anthropometric Component	Clinical Component	Intervention/ Weight-Loss Goal	Clinical Goals
TERTIARY PREVENTION				
Overweight or Obesity	BMI ≥25 (≥23 in certain ethnicities)	Polycystic ovary syndrome	5% to 15% or more	• Ovulation • Regularization of menses • Reduced hirsuitism • Enhanced insulin sensitivity • Reduced serum androgen levels
		Female infertility	10% or more	• Ovulation • Pregnancy and live birth
		Male hypogonadism	5% to 10% or more	Increase in serum testosterone
		Obstructive sleep apnea	7% to 11% or more	• Improved symptomatology • Decreased apnea-hypopnea index
		Asthma/reactive airway disease	7% to 8% or more	• Improvement in forced expiratory volume at 1 second • Improved symptomatology
		Osteoarthritis	• ≥10% • 5% to 10% or more when coupled with exercise	• Improvement in symptomatology • Increased function
		Urinary stress incontinence	5% to 10% or more	Reduced frequency of incontinence episodes
		Gastroesophageal reflux disease	10% or more	Reduced symptom frequency and severity
		Depression	Uncertain	• Reduction in depression symptomatology • Improvement in depression scores

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

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
• 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 Team member or expertise: dietitian, health educator	• 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 Team member or expertise: exercise trainer, physical activity coach, physical/occupational therapist	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: health educator, behaviorist, clinical psychologist, psychiatrist

3.

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/m^2) 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/m^2) or obesity who have weight-related complications, particularly if severe, in order to achieve sufficient weight loss to ameliorate the complication (tertiary prevention).

3. 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

CLINICAL CHARACTERISTICS OR COEXISTING DISEASES

▶ Diabetes Prevention (metabolic syndrome, prediabetes)		
▶ Type 2 Diabetes Mellitus		
▶ Hypertension		
CARDIO-VASCULAR DISEASE:	▶ CAD	
	▶ Arrhythmia	
	▶ CHF	
CHRONIC KIDNEY DISEASE:	▶ Mild (50–79 mL/min)	
	▶ Moderate (30–49 mL/min)	
	▶ Severe (<30 mL/min)	
▶ Nephrolithiasis		
HEPATIC IMPAIRMENT:	▶ Mild-Moderate (Child-Pugh 5–9)	
	▶ Severe (Child-Pugh >9)	
▶ Depression		

▶ Anxiety		
▶ Psychoses		
▶ Binge Eating Disorder		
▶ Glaucoma		
▶ Seizure Disorder		
▶ Pancreatitis		
▶ Opioid Use		
WOMEN OF REPRODUCTIVE POTENTIAL:	▶ Pregnancy	
	▶ Breast-feeding	
▶ Age ≥65 years *		
▶ Alcoholism / Addiction		
▶ Post-Bariatric Surgery		

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.

WEIGHT-LOSS MEDICATIONS APPROVED BY THE FDA FOR LONG-TERM TREATMENT OF OBESITY

ANTI-OBESITY MEDICATION | TRADE NAME | YEAR OF FDA APPROVAL

| **Orlistat** (Xenical™) (Alli™) – OTC 1999 | ▶ | **Lorcaserin** (Belviq®) 2012 | ▶ | **Phentermine/ Topiramate ER** (Qsymia®) 2012 | ▶ | **Naltrexone ER/ Bupropion ER** (Contrave®) 2014 | ▶ | **Liraglutide 3 mg** (Saxenda®) 2014 | ▶ |

Mechanism of Action, Study Name, Study Duration: % TBWL Greater Than Placebo	Dose	Common Side Effects	Contraindications, Cautions, and Safety Concerns ✓ Contraindication • Warning, Safety Concern	Monitoring and Comments

ABBREVIATIONS | RECOMMENDATIONS | REFERENCES

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

1. Wyatt HR. Update on treatment strategies for obesity. *J Clin Endocrinol Metab.* 2013;98(4):1299-1306.
2. Garvey WT, Garber AJ, Mechanick JI, Bray GA, Dagogo-Jack S, Einhorn D, et al. American Association of Clinical Endocrinologists and American College of Endocrinology position statement on the 2014 advanced framework for a new diagnosis of obesity as a chronic disease. *Endocr Pract.* 2014;20(9):977-989.
3. Yanovski SZ, Yanovski JA. Long-term drug treatment for obesity: a systematic and clinical review. *JAMA.* 2014;311(1):74-86.
4. Fujioka K. Current and emerging medications for overweight and obesity in people with comorbidities. *Diabetes Obes Metab.* 2015;17(11):1021-1032.
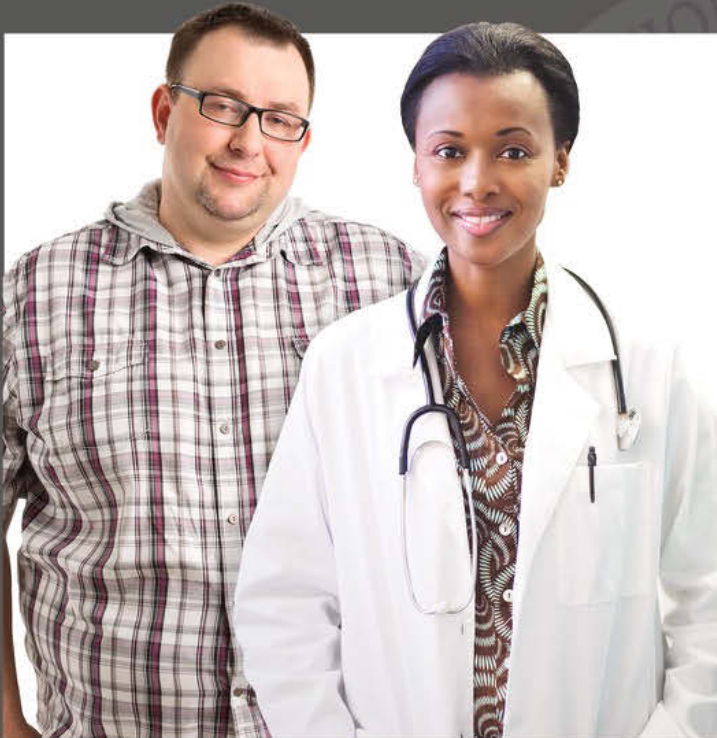
4.

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.

Summary

- Obesity is a disease
    - Genetic, environmental, and behavioral factors all contribute to its pathogenesis
    - The pathophysiology involves neuroendocrine factors involved in regulating both appetite and energy balance
    - Impairments in physical and physiologic functioning contribute to high rates of morbidity and mortality