

# insights & Implications

## IN GERONTOLOGY

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## The Chronic Disease of Obesity

**Ellie: Does this mean I'm gonna get fat?**

**Charlie: No, it doesn't. I was always big. I just let it get out of control.**

Overweight and obesity are usually nothing new for people who enter older adulthood with extra weight. Many always have been big, as Oscar-winning Brendan Fraser's character, Charlie, in *The Whale* relates in the above exchange with his daughter. Others experience midlife bulges due to stress, anxiety and/or depression, eating on the fly or on the road, and inactivity. Whatever their journey, people of larger sizes have heard the platitudes at doctors' offices; processed the prodding of parents, partners, and friends to watch their appetite and control themselves; and seen the side glances and averted looks in public. As a result, people with overweight and obesity may delay care, isolate from family and friends, and avoid social gatherings and public events.

Even in their work lives and professional careers, people with overweight or obesity are more often overlooked during hiring processes, passed by for promotions, and earn less than colleagues. Perhaps the

deepest cut for people with overweight and obesity comes when Medicare and many other third-party payers refuse to cover therapies that could stop their progression into arthritis, hypertension, obstructive sleep apnea, cardiovascular disease, diabetes, renal disease, gastric disease, nonalcoholic fatty liver disease, and cancer.

Obesity rates for adults 65 years of age and older have nearly doubled over the last 30 years increasing from 22% in 1988 to 42% in 2020. This increase has brought much needed awareness to older adults and their unique needs when it comes to discussions around and treatment options for overweight and obesity.<sup>1,2</sup> The good news for today's older adults with overweight and obesity is that clinical medicine has finally recognized that obesity is a chronic disease that, like others, requires management across the lifespan. In this issue of *Insights & Implications in Gerontology*, current concepts are presented about the complex interplay among the stomach, liver, pancreas, brain, and metabolic processes of the body. Recognition of obesity as a chronic disease by medical organizations is discussed, and the need for integration of their guidelines into multifaceted and interdisciplinary care of the older adult is presented.

### Starting the Body Size Conversation With Older Adults

Because of the stigma associated with overweight and obesity, people are reluctant to confront this disease in the way they do with other chronic conditions such as high blood pressure, diabetes, high cholesterol, or osteoarthritis. Body size and altered distribution of fat can be the underlying causes of other chronic diseases and key factors in the development of pain and other symptoms.

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Before starting the conversation, the values and goals of the older person related to weight management must be explored. Older adults with overweight or obesity are often looking for help with their body size. However older persons too often receive limited guidance from health professionals about weight and weight loss. Additionally, older adults reported that excess weight negatively impacts overall health and well-being and that maintaining or improving their health is a top priority and motivator for weight loss. Older adults, like younger adults, may be concerned about their body size and are looking for a health care provider who will partner with them rather than dismiss or diminish their concerns about the impact of obesity on their health.

In adults with overweight and obesity, an estimated 40% experienced implicit and/or explicit bias due to their weight.<sup>3</sup> Exposure to overweight and obesity-related weight bias is associated with increased prevalence of morbidity, psychological distress, eating disorders, social isolation, and exercise avoidance. Further, in a longitudinal study of 13,692 older adults, weight discrimination was associated with a 60% increased risk of mortality.<sup>4</sup>

Unfortunately, weight-biased attitudes, including the belief that individuals have obesity because they are lazy, incapable of change, uneducated, or lack motivation, are common among health care providers.<sup>5</sup> Health care providers who hold these biases may consciously or unconsciously spend less time with the patient, withhold or delay treatment options, show less respect, and/or associate all other health problems with overweight or obesity. Patients with overweight and obesity who experience these attitudes and behaviors are more likely to avoid clinical care and appointments that require being weighed or exposing the body and less likely to trust and have open and honest communication with health care providers.<sup>6</sup> There is an urgent need for health care providers and health care organizations to confront these biases by recognizing that obesity is a multifaceted disease with specific and treatable causes and not a failure of the individual, a character flaw, or a lack of willpower.

## Removing the Stigma

With obesity being a common and all-too-often misunderstood disease, health care providers and their staff members must first work to broach discussions about body size in ways that will lead to positive interactions and not shame or self-blame. Kickstarting this conversation requires education and sensitivity on the part of providers and training in the effective use of empathic, patient-centered communications.

Respect for people of all body sizes is paramount for removing the stigma of overweight and obesity and opening the door to productive conversations in the medical setting. This begins in the waiting area of clinics or medical offices, where appropriate seating for people of all sizes should be available.

To provide empathic care to people of all body sizes, health care providers and staff members must first address their own biases and misconceptions about weight. These implicit biases are difficult for people to recognize and address. They can be detected and better understood using tools such as the [Implicit Associations Test for Weight Bias](#), which is available through the Strategies to Overcome and Prevent (STOP) Obesity Alliance website.<sup>7</sup>

Behavioral change and lifestyle approaches in combination with medication and/or surgery are essential to lose weight and maintain it at the desired goal. By incorporating this knowledge into clinical practice and approaching the treatment of overweight and obesity just as they would treat an individual's high blood pressure or dyslipidemia, the health professional is able to provide the care the patient needs.

Resources are available to educate all staff in the medical office, including materials from the Gerontological Society of America (GSA), as listed at the end of this report. All medical office or clinic staff—receptionists, medical assistants, and health professionals—should learn appropriate ways of talking with patients about weight and understand the disease processes that lead to chronic weight gain and maintenance of body size at unhealthy levels.

## Respecting the Patient's Preferences

During intake for their health care visits, patients should be asked what terms they prefer when referring to body size and whether it is okay to measure their weight during the visit. People with larger body sizes can find stepping on the scale one of the most stressful parts of a routine medical visit. While well-meaning, comments by health care providers and staff about



the need for weight loss or the negative impact of weight on health conditions could add to the shame and frustration that patients may already feel.

Weight should be measured in areas where other staff and patients cannot hear or see the measurements; to do otherwise violates confidentiality as well as leads patients with overweight and obesity to avoid medical visits or look elsewhere for providers who can help them address body size. Additionally, prior to taking measurements, health care providers and staff should explain what measurements are being taken and confirm with the patient consent to the measurement being collected. Weight and/or waist circumference measurements are just as confidential as other medical information and test results, and likewise this information should be managed with the utmost of privacy.

### **Changing the Conversation Through the Use of Destigmatizing Terms**

Working with office staff to establish new systems of caring for older adults with overweight/obesity is a pivotal step in moving beyond “eat right and exercise” advice. Through education and awareness, the staff can engage people with obesity positively, use person-centered (or person-first) language, make people of all sizes feel welcome, and use current guidelines to provide evidence-based care.

Person-centered language uses destigmatized, empathic terms that keep the individual at the center of the discussion. Avoid saying “obese people” and “he is obese.” Instead, terminology to use should include “people with obesity or overweight,” just as patients or people may have diabetes or any other clinical condition. The transition to person-centered language is a difficult but very important process.

Rather than focusing on pounds and body mass index (BMI), physicians and the interprofessional care team should talk about what goals the older adult has and what it would mean to achieve those goals. The ultimate goal for most older adults is to engage in a healthy lifestyle, manage or prevent the development of chronic health conditions, and maintain their independence and function. Some older adults have a goal of lowering their blood pressure; others wish to decrease their knee pain. Irrespectively, the common avenue to achieve the goal is often weight reduction.

Health care providers and staff should have responses ready for common roadblocks that stop patients from addressing overweight and obesity. Appropriate and helpful responses to common patient statements are shown in Figure 1.

**Weight and/or waist circumference measurements are just as confidential as other medical information and test results, and likewise this information should be managed with the utmost of privacy.**

**Figure 1. Positive Responses to Common Roadblocks to Addressing Overweight and Obesity**



## The 6 As Model

Motivational interviewing is an invaluable technique for helping people move toward their personal goals, whether to stop smoking, drink less alcohol, or lose weight. The *5 As intervention used for tobacco cessation* has been expanded to the 6 As for discussing overweight and obesity (Figure 2).<sup>8</sup>

Older adults with overweight and obesity may not be motivated by getting to a certain body size, but they are very motivated about their ability to maintain their independence. The Geriatric 5Ms framework is useful to remember what should be emphasized when talking with older adults: *mind, mobility, medications, multicomplexity, and matters most*.<sup>10</sup>

## Diagnosing Overweight and Obesity: It's Not Just Weight

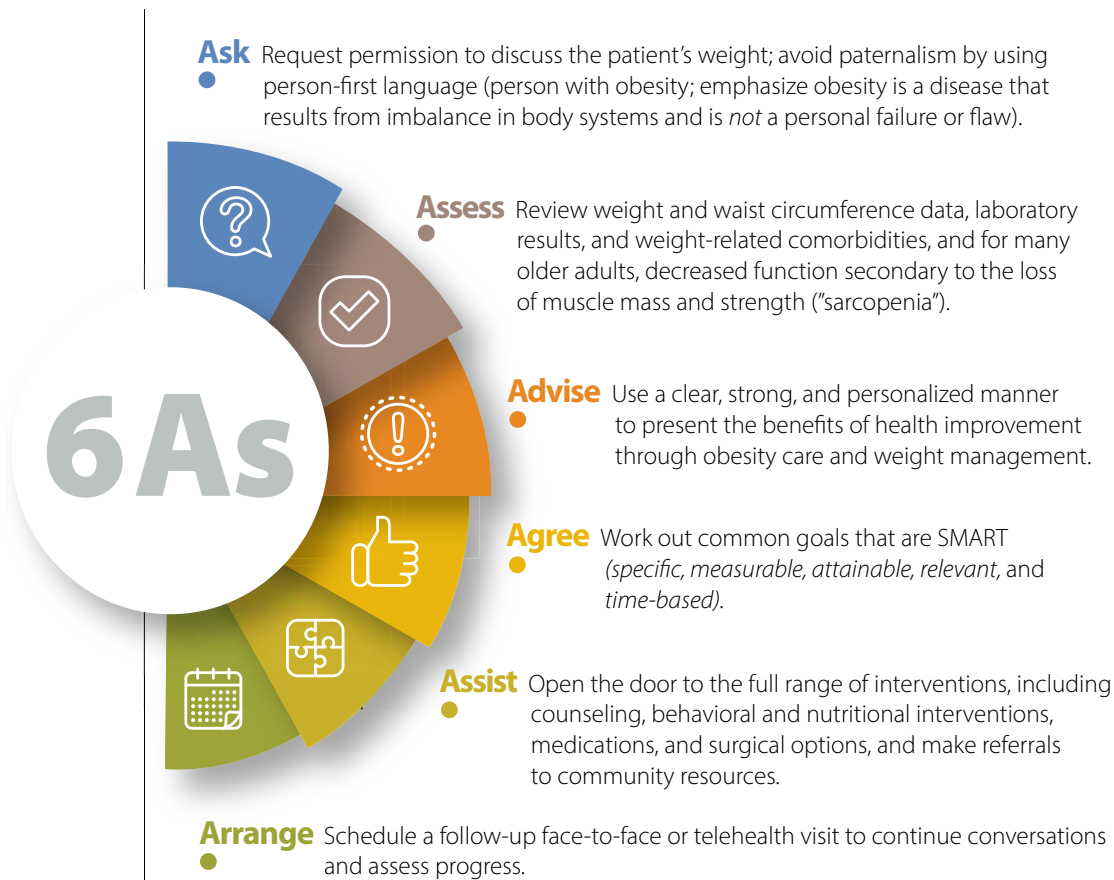
As the conversation moves from motivation to action, health care providers should complete a full history of the patient's weight journey (weight history, when weight was gained or lost, current and past diet and exercise patterns, and current medications), dispel incorrect notions about what defines success in body size management, and talk with the patient about personal goals and a mutually agreed-upon treatment plan that can achieve those goals.

## BMI, Waist Circumference, and Diagnostic Categories

Building on previous conversations, the team should dispel the notion that BMI defines a person's diagnosis and will be the goal during treatment. This measure is used in current diagnostic criteria and is mandatory for billing purposes. The U.S. Food and Drug Administration uses BMI in its approved indications for medications. For these reasons, BMI is considered when diagnosing overweight and obesity and is tracked during treatment. However, BMI was originally developed for other purposes, is a poor measure of body size, may inaccurately assess health risks in older adults, and must be adjusted for Asian individuals. Hence, we must consider measures past BMI.

Waist circumference is a key measure in assessing a person's body shape and risk for complications. Increased waist circumference indicates the potential for excess adipose tissue around the middle of the body ("central obesity"), which is associated with a greater risk of cardiovascular disease, type 2 diabetes, and all-cause mortality. As explained in a footnote of Figure 3,<sup>11-15</sup> waist circumference of 102 cm (40 inches) or less in men and 88 cm (35 inches) or less in women is considered normal, but different cut points are more appropriate for people of various race and ethnicities (e.g., Asian and Latinx individuals).<sup>11</sup>

Figure 2. The 6 As Model



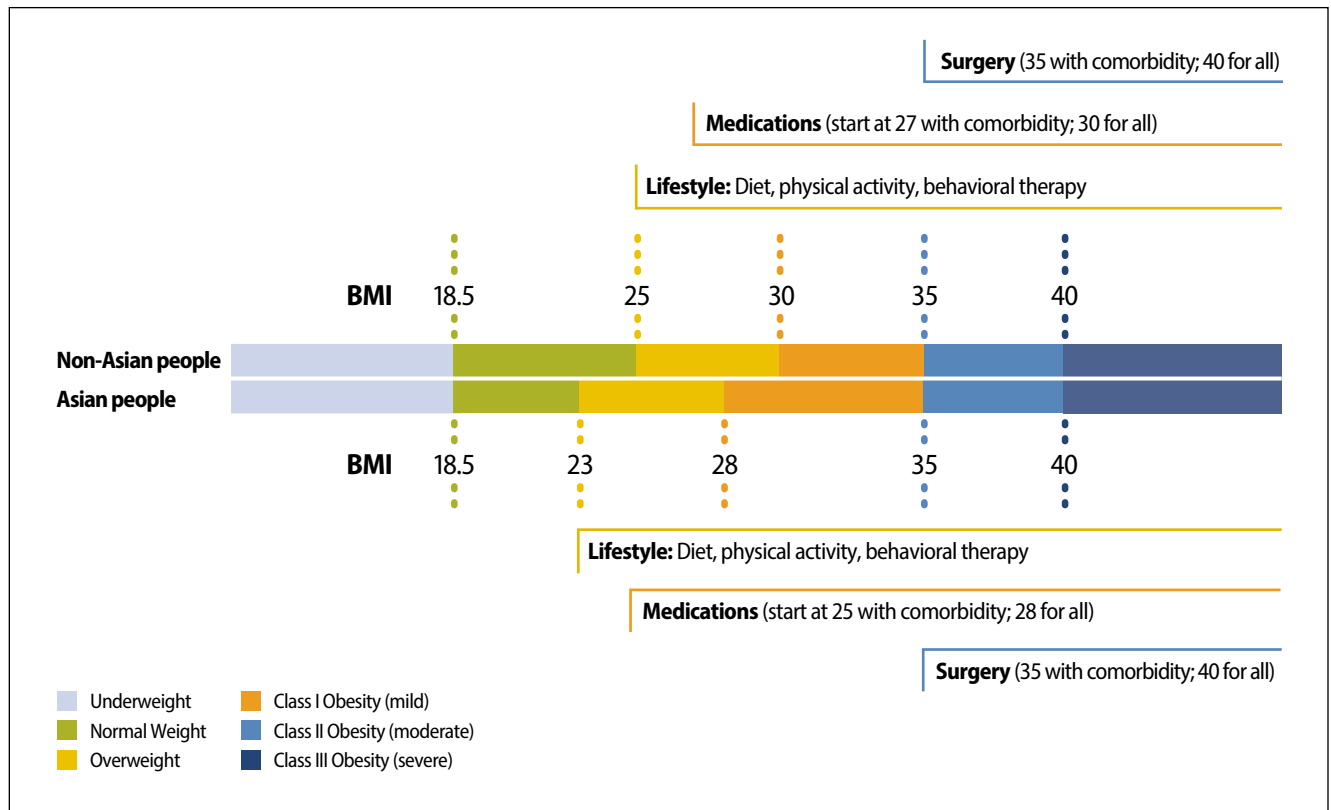
Sources: References 8–9.

Other clinical information needed for developing a care plan includes the presence of concomitant chronic diseases (e.g., hypertension, prediabetes or diabetes, cardiovascular diseases, bone and joint conditions), complete medication history, information on the person's current cognitive status, ability to perform activities of daily living and instrumental activities of daily living, presence of sarcopenia, any available information on muscle mass and body fat, and the person's need for social support.

If BMI and waist circumference show that patients have overweight or obesity, the health care team works with them to design personalized approaches to treatment. During the diagnostic process, patients should have laboratory tests to provide a baseline for future assessments. Tests should include complete blood count, metabolic panel, lipid panel, liver function tests, kidney function tests, and cardiovascular tests. Periodic glucose tests are needed to determine whether a patient has prediabetes or diabetes. Baseline values of all these tests outside the normal range can be used as motivators to move patients toward treatment of overweight and obesity. During weight loss, improvements in these test results should be pointed out to patients to maintain their motivation and dedication to the body size journey.



**Figure 3. Classifications of Weight and Recommended Points at Which Interventions Are Recommended in Treatment Guidelines**



- Numbers in the figure represent BMIs. This measure is calculated as weight in kilograms divided by the square of height in meters ( $\text{kg}/\text{m}^2$ ).
- Some experts recommend using 17.5 as the cut point between underweight and normal weight for people of Asian race. Guidelines in Asian nations differ on the exact BMIs considered underweight, normal weight, and overweight. The cut point of 23.5 for normal weight and overweight recognizes that Asian individuals in general should be monitored for diabetes at lower BMIs than other race or ethnic groups. However, this is a heterogeneous group, and findings have varied among subgroups of the Asian population.
- Increased waist circumference is considered a comorbidity risk and a reason to start medications at BMIs of 25 for Asian people and 27 for non-Asian people. For people of Asian descent, the waist circumference cutoff points are appropriate: 94 cm [37 inches] and 80 cm [31.5 inches] for men and women, respectively). Waist circumference cutoff points of 94 cm (37 inches) for men and 90–92 cm (35–36 inches) for women have been identified for Latinx individuals (a person of Latin American origin). For other people in the United States and Canada, waist circumference is considered normal when it is 102 cm (40 inches) or less in men and 88 cm (35 inches) or less in women.

BMI = body mass index.

Sources: References 11–15.

### Sarcopenic Obesity and the Importance of Proper Nutrition While Restricting Caloric Intake

Before embarking on any effort to reduce body size, the older adult should be screened for the loss of muscle mass and strength, termed sarcopenia. When people pursue caloric reduction without consuming all the requisite protein, carbohydrates, essential fatty acids, and other nutrients, their weight loss can lead to a reduction in fat-free mass (muscle and bone mass) while concomitantly losing adipose tissue. Even though people may not appear to have frailty, they may be weak and unable to carry out essential activities such as walking or rising from a chair.<sup>16</sup>

As shown in Table 1, the SARC-F instrument—consisting of five questions related to *strength*, *assistance* walking, *rising* from a chair, *climbing* stairs, and *falls*—can be used to screen for sarcopenia in older adults with obesity and in other patients with elevated BMIs and waist circumferences. The patient responds to the five questions, and the answers are scored as shown. Scores of 4 or more indicate possible sarcopenic obesity. Diagnosis of sarcopenic obesity is made using tests of skeletal muscle function, such as chair stands

and hand-grip strength, and evaluation of body composition using dual-energy x-ray absorptiometry (preferred) or bioelectrical impedance analysis (alternative).<sup>17,18</sup>

### Red-Flag Conditions

Older adults often have several medical conditions. This makes it essential to screen patients of larger body sizes for certain red-flag conditions such as prediabetes, diabetes, dyslipidemia, hypertension, and liver disease. In designing a treatment plan, the health care team keeps in mind those conditions that are often improved with weight loss: prediabetes or diabetes and cardiometabolic conditions such as elevated blood pressure and cholesterol levels. Kidney and liver health, asthma, and obstructive sleep apnea also may improve with weight loss.<sup>19</sup>






## Intently Addressing Obesity in Older Adults

Overweight and obesity are now recognized as chronic health conditions with specific pathophysiologic causes, complications if these conditions are not addressed, and treatments that are safe and effective. For most older adults, treating overweight and obesity can add years to their lifespan and, importantly, add quality to the years of life when they are healthy.

### Management Through Diet, Lifestyle, Medications, and Surgery

People with overweight or obesity have traditionally been treated through a stepped approach, starting with changes in diet and lifestyle, adding medications if needed, and proceeding to bariatric surgery as a

**Table 1. Sarcopenia Screening Assessment Using the SARC-F Instrument**

Functional Component	Question	Scoring <sup>a</sup>
<b>Strength</b> 	How much difficulty do you have in lifting and carrying 10 pounds?	None = 0 Some = 1 A lot or unable = 2
<b>Assistance in walking</b> 	How much difficulty do you have walking across a room?	None = 0 Some = 1 A lot, use aids, or unable = 2
<b>Rise from a chair</b> 	How much difficulty do you have transferring from a chair or bed?	None = 0 Some = 1 A lot or unable without help = 2
<b>Climb stairs</b> 	How much difficulty do you have climbing a flight of 10 stairs?	None = 0 Some = 1 A lot or unable = 2
<b>Falls</b> 	How many times have you fallen in the past year?	None = 0 1–3 falls = 1 ≥4 falls = 2

<sup>a</sup>Scores on each of the 5 questions are summed. Sums of 4 or more are considered indicative of sarcopenia.

Source: Reference 18.

Rather than focusing on a specific weight or BMI as the goal of weight loss, the health care provider and the patient can talk about percentage reductions in body size.

last resort. Current guidelines recognize that patients presenting with obesity-related conditions such as cardiovascular disease or diabetes and those with obesity are best treated initially with medications in addition to lifestyle and diet changes. For people with very large body sizes (BMI  $\geq 40$ ), referring to bariatric surgery at the beginning of the treatment journey is indicated, particularly since an appointment with a qualified surgeon may not be available for weeks or months.

These changes in the therapeutic management of overweight and obesity are the result of basic research into the mechanisms used by the brain, pancreas, and gastrointestinal system to signal the need to eat and when to stop. As these mechanisms were recognized, medications were developed to mimic or interrupt signals causing abnormal satiation (“hungry brain”), abnormal hedonic eating (“emotional hunger”), abnormal satiety (“hungry stomach”), and low energy expenditure (“slow burn”).<sup>20</sup>

By recognizing these abnormalities as the real causes of overweight and obesity, health professionals and medical organizations now know that this is a chronic disease requiring lifelong treatment. As with hypertension and dyslipidemia, long-term management is needed to reach and remain at the patient’s chosen body size.

### Shared Decision-Making and Goal-Setting With Patients

Patients must be actively involved in setting a goal for their treatment process and choosing the interventions to incorporate into their personal lifestyle. Whether it’s diet, exercise, medications, or proper management after bariatric surgery, patients ultimately must be committed to their plan to be successful.

In developing a plan, addressing any myths or misinformation that the patient has about weight loss is essential. Common beliefs and sample responses are listed in Table 2.<sup>21–24</sup> Patients can also get up-to-date information about treatment by reviewing the [“POWER” chart on the American Gastroenterological Association website](#) or the part of the [American Association of Clinical Endocrinology obesity website](#) developed for non–health care professionals. An [infographic from The Obesity Society](#) on potential causes and contributors for weight gain is also a useful resource for patients.



The process of the health care provider and patient setting mutual goals and deciding together on interventions is called shared clinical decision-making. Using the latter three components of the 6 As model presented in Figure 2 (Agree, Assist, Arrange),<sup>8</sup> clinicians describe the available options and their advantages or disadvantages, and the patients talk through what they can commit to and incorporate into daily life.

Rather than focusing on a specific weight or BMI as the goal of weight loss, the health care provider and the patient can talk about percentage reductions in body size. The provider can explain how each percentage point lost can help control diabetes, blood pressure, lipids, liver disease, and kidney disease. Progression from prediabetes to diabetes is also slowed or stopped by loss of as little as 5% or 7% of body weight.<sup>25</sup>

Whatever goal is chosen, the SMART process can be applied by making goals *specific, measurable, attainable, relevant, and time-based*. After the patient and health care provider agree on a plan, the interprofessional team and patient work together to implement the behavioral and lifestyle changes, such as the following:

- Adhering to a healthy diet.
- Incorporating aerobic and resistance exercise into a daily routine.
- Using medications properly and safely.
- Working with a psychologist to identify new skills and ways of thinking about health choices.
- If needed, referring the patient to a qualified surgeon to determine whether bariatric surgery is an appropriate treatment.



Follow-up visits with a relevant interdisciplinary team member should be scheduled every three months to track the patient's progress and add new interventions if needed. Since most older adults with

overweight and obesity have additional diseases, team members may include registered dietitians, nutritionists, and other qualified practitioners with experience in geriatrics.

**Table 2. Top 10 Myths About Weight Loss and Sample Responses**

## 1 It's just calories in/calories out. Anyone can lose weight by eating less or exercising more.

While weight loss does require a calorie deficit and counting calories is one way of achieving that, it is just as important to focus on the quality of foods eaten and use other interventions that can alter the complex web of hormonal and physiological systems that control the impulse to eat and how much energy the body dissipates through usual activities of life.

## 3 Cutting out carbohydrates or fat makes you lose weight.

The *Dietary Guidelines for Americans 2020–2025* recommends a healthy eating plan that emphasizes fruits, vegetables, whole grains, and fat-free or low-fat milk and milk products, includes protein sources, is low in saturated and trans fats and added sugars, and stays within the person's daily caloric needs. Eliminating any major component of a healthy diet is not healthy.

## 6 Cut out breakfast.

This is one of the worst things a person can do while trying to lose weight. As opposed to helping, studies have shown skipping breakfast is associated with overweight and obesity—and the association is greater than with alcohol consumption or levels of inactivity.

## 9 It is possible to focus weight loss on one part of the body.

Exercises can be used to tone particular areas of the body where people want to lose weight, but the caloric restriction needed for weight loss affect all parts of the body.

## 2 “Elimination” diets work best for losing weight.

People need to use methods in losing weight that are sustainable and that they are able to maintain for the rest of their lives. Removing specific foods from one's diet may (or may not) be effective for weight management, but if the person doesn't want to live without the eliminated food forever, fad diets are not recommended.

## 4 Never snack!

When healthy foods such as fruits are chosen, snacks can help get people on diets from meal to meal without hunger or symptoms of hypoglycemia. Like eliminating treats, omitting all snacking is also not an intervention most people can maintain over the long term.

## 7 Eating certain foods—such as pineapple, ginger, garlic, chili peppers, onions, asparagus, or avocados—will speed up the body's metabolism and help burn fats.

No foods have been found to burn fats. People need to eat a healthy diet; if it includes these foods, that's fine, but it won't increase weight loss.

## 5 You have to go hungry.

To establish a long-term, healthy eating pattern, people actually should not go hungry. A good rule to follow is to never skip a meal and to use healthy snacks if hunger occurs between meals.

## 8 Artificial sweeteners help people lose weight.

People who drink lots of sugar-laden teas or carbonated beverages can avoid those calories by using artificial sweeteners, but most evidence shows that use of these products is actually associated with a higher body mass index and greater cardiometabolic risks.

## 10 Eliminating gluten helps with weight loss.

This is not true, and gluten-free diets are frequently low in fiber. That causes people to feel less full after meals and thereby eat more.

Sources: References 21–24.

### **Incorporating Current Guidelines Into Care Plans**

For the past decade, clinicians have relied on an obesity treatment guideline developed by the American Heart Association, the American College of Cardiology, and The Obesity Society. Their algorithms and guidelines provide useful guidance for many aspects of obesity management, but more recent recommendations incorporate the recently marketed antiobesity medications and other clinical advances. These include Chapter 8 of the American Diabetes Association's Standards of Care in Diabetes—2023 and the American Gastroenterological Association's clinical practice guideline on pharmacological interventions for adults with obesity.<sup>13,14</sup>

When caring for older adults with overweight and obesity, the clinician must personalize treatments by considering concomitant disorders, functional deficits, exercise capabilities, dietary needs, and other factors. As discussed earlier, BMIs listed in the algorithm should be combined with waist circumference (for individuals with BMI 25–34.9), clinical assessment, body shape and size, and race/ethnicity to reach a diagnosis of overweight or obesity.<sup>26,27</sup>

Health care providers should also consider other factors that can affect weight homeostasis: sleep deficits and circadian rhythm disorders, mental health (social anxiety and mood disorders), infections, smoking cessation, thyroid function, and chronic inflammation.



Patients with BMIs of 40 or higher and those unlikely to reach target BMIs with diet, exercise, and most medications (especially the older agents) can be referred for bariatric surgery while other concomitant interventions are started. Getting appointments to meet with credentialed bariatric surgeons can take months. Because bariatric surgery requires the patient to make a lifelong commitment to a special diet and exercise regimen, a detailed presurgical assessment takes several months to complete. If surgery may be needed and is an option the patient would consider, the process should be started early in treatment.

### **Lifestyle Interventions Through Interdisciplinary Care**

Diet and exercise are the two primary lifestyle factors that are addressed in treating overweight and obesity. As with other interventions for overweight and obesity, a lifelong commitment is needed to maintain the desired body size. Choosing the right regimen for older adults can be challenging when a person's concomitant cardiovascular, musculoskeletal, and respiratory conditions are considered. Involving the complete interdisciplinary team is imperative, particularly registered dietitians, nutritionists, exercise physiologists, and in some cases, physical or occupational therapists.

Body size can often be reduced by 5% or 10% with a lower-calorie diet with or without pharmacotherapy, but maintaining the target weight often requires meeting the Centers for Disease Control and Prevention physical activity guidelines for most older adults: at least 150 minutes of moderate-intensity aerobic activity such as brisk walking, at least two days a week of resistance exercise that targets all major muscle groups, and activities to improve balance such as standing on one foot.<sup>28</sup>

Certain key nutrients must be prioritized when dieting for weight loss. As individuals get older, the ability to stimulate muscle protein synthesis is blunted. To combat anabolic resistance, older adults should consume 1.0–1.2 grams of protein per day per kilogram of body weight.<sup>29</sup> Additionally, older adults undergoing weight loss are at risk of losing 25% or more of lean muscle mass.<sup>30</sup> For this reason, meeting protein and resistance training recommendations during weight loss is crucial for the maintenance of muscle mass and physical function.

The body's need for calcium and vitamin D also increases with age. The Recommended Dietary Allowances (RDA; daily dietary intake level that covers the needs of ≥97.5% of the population) of calcium and vitamin D for older adults are listed in Table 3.<sup>31</sup>

**Table 3. Recommended Dietary Allowances of Calcium and Vitamin D for Older Adults**

Sex and Age	Calcium (mg/day)	Vitamin D (IU/day)
Men 51–70 years of age	1000	600
Women 51–70 years of age	1200	600
All adults 71 years of age or older	1200	800

Source: Reference 31.

Fiber is another priority nutrient. The RDA for fiber is 21 grams for women and 30 grams for men 50 years of age and older. However, many adults fail to meet these recommendations. Fiber is essential for gut motility and maintenance of gastrointestinal health and aids in managing blood glucose control and absorption of cholesterol. Further, consuming a diet rich in fiber has been associated with a reduced risk of type 2 diabetes, colorectal cancer, and cardiovascular disease. Foods high in fiber include whole grains, fruits, vegetables, legumes, nuts, and seeds. When possible, nutrients should be obtained through foods before turning to a supplement.

While it is difficult for older adults who commonly have diseases that limit their ability to participate in aerobic and resistance exercise, an onsite, high-intensity, comprehensive lifestyle program that lasts six months or more benefits participants. Such programs are associated with the maintenance of weight loss over time.<sup>26</sup> People who are not able to access such programs can set up similar programs in the home or take advantage of programs delivered using video-based technology. Home programs can incorporate periods of exercise several times per day. This approach is useful for patients with cognitive disorders, time limitations, and/or physical limitations. Older adults in rural areas have lost weight and improved physical function using technology-based obesity interventions.<sup>32</sup>

### Antiobesity Medications

A number of new and exciting medications and combinations of older agents have changed the landscape for people with overweight and obesity. These agents are helping older adults and others achieve the requisite net energy loss when used as adjuncts to diet and exercise. Once weight loss is achieved, medications, exercise, and diet must be continued to prevent regain of the weight.

As shown in Table 4, some older drugs have adverse effects that limit their use. Orlistat acts by reducing fat absorption in the gastrointestinal tract, which causes adverse effects unacceptable to many people:

stomach pain, diarrhea, gas with discharge, inability to control stools, and fatty or oily stools. Phentermine, pharmacologically related to amphetamines, can cause dependence, hypertension, angina, and myocardial infarction.<sup>13,14,33-37</sup>

Newer medications that were originally developed and approved for the management of type 2 diabetes build on the advances in understanding the role of glucagon-like peptide-1 hormone in weight management. Liraglutide, semaglutide, and tirzepatide are glucagon-like peptide-1 receptor agonists (GLP-1 RAs) that decrease gastric emptying time (making the person feel fuller longer), inhibit hunger signals from the gastrointestinal tract to the brain's satiety center, and decrease reward behavior in the brain from eating too much.

The GLP-1 RAs have produced percentage reductions in body size beyond levels expected with orlistat and phentermine. The clinical results seen with liraglutide, semaglutide, and tirzepatide (a dual-action GLP-1 RA that is also a glucose-dependent insulinotropic polypeptide agonist) make them reasonable alternatives to bariatric surgery for some people.<sup>33-37</sup>

As shown in Figure 3, medication therapy may be appropriate at the beginning of treatment in people with BMIs of 30 or more and those with BMIs of 27 to 30 who also have weight-related comorbidities such as hypertension or diabetes. The drugs may also be indicated in patients whose BMIs are between 25 and 27 after the first three months of treatment if diet and exercise do not produce weight loss of 5% or more.

Medication therapy is effective for losing weight, but it does not take the place of dietary, exercise, and lifestyle interventions delivered by an interdisciplinary team. None of the interventions are effective alone; people must have a healthy, calorie-controlled diet and adequate aerobic and resistance exercise for medications to work. Success depends on interprofessional collaboration.<sup>38</sup>

Success depends on interprofessional collaboration.

**Table 4. Clinical Considerations With Use of Antiobesity Medications<sup>a,b</sup>**

Antiobesity Medications	Use With Caution in Patients With CVD	Adverse Effects	Comments	Expected Weight Loss			
				5%	5%–10%	10%–20%	≥20%
Long-term treatment (>12 weeks)							
Semaglutide 2.4 mg <sup>c</sup>		GI effects (constipation, diarrhea, stomach pain, nausea and vomiting, bloating, burping, gas, heartburn); headache; lethargy; nose or throat irritation; runny nose	Contraindicated in patients with personal or family history of medullary thyroid cancer; suicidal behaviors (particularly in younger people)		■	■	
Liraglutide 3.0 mg <sup>c</sup>					■		
Tirzepatide <sup>c,d</sup>							■
Phentermine/topiramate ER	Yes; monitor BP/HR	Acute myopia with secondary angle-closure glaucoma (topiramate); phentermine adverse effects are listed below.	May be preferred in patients with comorbid migraines		■		
Naltrexone/bupropion ER	Contraindicated in uncontrolled hypertension; monitor BP	Dilation of the pupil of the eye, which can lead to angle-closure glaucoma	Could have advantages in patients attempting smoking cessation or with depression  Avoid/use with caution in patients with seizure disorders  Contraindicated with chronic opioid therapy		■		
Orlistat		Stomach pain; diarrhea; gas with discharge; inability to control stools; fatty or oily stools	AGA recommends against use; could be useful to small minority of patients who have low target weight loss goals and do not mind GI side effects	■			
Short-term treatment (≤12 weeks)							
Phentermine	Yes; monitor BP/HR	Dependence; hypertension; angina; myocardial infarction	While approved for 12-week treatment periods, health care providers prescribe this agent off-label for longer periods	■	■		
Diethylpropion	Yes; monitor BP/HR	Has a number of contraindications and is involved in significant drug interactions  Affects the central nervous system and can cause heart failure through myocardial toxicity; primary pulmonary hypertension; associated with development of valvular heart disease	While approved for 12-week treatment periods, health care providers prescribe this agent off-label for longer periods	■	■		

<sup>a</sup> Information based primarily on ADA and AGA recommendations and information in the product labeling.

<sup>b</sup> All agents other than orlistat are contraindicated in pregnancy and individuals trying to become pregnant.

<sup>c</sup> Also lowers blood glucose and is useful in patients with diabetes.

<sup>d</sup> This agent was approved in 2022 and is not included in the guidelines of the ADA and AGA that are current in 2023.

ADA = American Diabetes Association; AGA = American Gastroenterological Association; BP = blood pressure; CVD = cardiovascular disease; ER = extended release; GI = gastrointestinal; HR = heart rate.

Sources: References 13, 14, and 33–37.

Once an antiobesity medication is initiated, the patient should be monitored for effectiveness and side effects; the patient should know to contact the prescriber as needed during the first three months of use. A reassessment is in order if the patient has not lost 5% or more of baseline weight by three months. Adherence with the medication should be considered, along with intolerance, cost, and other reasons the patient may not be taking the medication as directed. If these factors are not present or the patient continues not to lose weight, the medication should be stopped due to a lack of efficacy and initiation of another medication should be considered.

The combinations of older drugs introduced in recent years are extended-release formulations of phentermine/topiramate and naltrexone/bupropion. Phentermine/topiramate is effective for weight loss but has the similar adverse effects and concerns as when phentermine is used alone (Table 4).<sup>13,14,33-37</sup> Topiramate is an anticonvulsant agent, and patients must taper this drug combination over one week to minimize breakthrough seizures during discontinuance.<sup>33</sup>

When these newer antiobesity medications are used to promote profound weight loss, the importance of nutritional and exercise interventions cannot be overemphasized. Sarcopenia is a real risk when weight is lost without adequate protein intake and resistance exercise for maintaining muscle mass.<sup>16</sup>

### **Bariatric Surgery**

The decision to proceed with bariatric surgery is not a trivial one, as patients must have an interdisciplinary assessment that includes an evaluation by the surgical team, psychologist, dietitian, and other allied health staff. Patients must be psychologically prepared and fully committed to following a regimen of exercise and special diets for the rest of their lives.<sup>39</sup>

For older adults, the risk-to-benefit consideration must also include: the short-term risks of surgery; the patient's ability to recover from surgery; the type of surgical intervention; the center where the surgery is being performed; the patient's social support, cognitive health, and ability to exercise and adhere to the diet given other comorbidities; and the number of years of expected life remaining for the person to enjoy the benefits of surgery.

Bariatric surgery can be considered in patients with BMIs of 40 or higher or 35 to 40 when they have comorbidities. Because bariatric surgery can be curative for type 2 diabetes—sometimes within three days—the procedure can also be considered in those with BMIs as low as 30. Other postsurgical improve-

ments are seen in weight (up to 35% weight loss), cardiovascular function, liver health, and many other systems of the body. Bone health is adversely affected by vitamin D deficiencies and increases in parathyroid hormone levels of 40% or more.<sup>26</sup> Following bariatric surgery, individuals can tolerate only a limited amount of food at a time, putting them at risk for nutrient deficiencies. Additionally, depending on the procedure, absorption of vitamin B<sub>12</sub> may be impaired and increase the risk for vitamin B<sub>12</sub> deficiencies. Education on supplements and proper nutrients is essential to avoid micronutrient deficiencies.

As with pharmacotherapy, the need for dietary, exercise, and lifestyle interventions delivered by an interdisciplinary team continues after bariatric surgery. Notably, given the complex care needed after bariatric surgery, an interdisciplinary team must be involved to address the unique health, nutrition, exercise and lifestyle, and pharmacotherapy needs of these patients.

### **Lifelong Management of Overweight and Obesity**

In the past decade, basic and medical research has established the physiologic and hormonal causes of overweight and obesity. This has led to its recognition as a disease and not a personal decision or character flaw. For older adults, this means that with sustained dedication, they can finally take off and keep off those extra pounds. They must understand that whatever means they use to reduce their body size must be continued for the rest of their lives.

While acknowledging the lifelong challenges that patients have experienced with obesity, clinicians should engage these individuals in positive conversations about what added years of life or greater activity would mean for them. Health care providers should also provide support and encouragement and be prepared to assist patients with quickly addressing small weight gains before they become larger ones and reinforcing weight management efforts. Patients should have office visits regularly to monitor weight and interventions; weight, waist circumference, body composition, and physical strength measurements should be routine along with standard laboratory tests; and dietary interventions should be taken if sarcopenia or other nutrient or vitamin deficiencies occur. Patients may need long-term contact with registered dietitians, exercise physiologists, physical or occupational therapists, social workers, pharmacists, and other involved members of the health care team.



## Conclusion

As numbers of Americans with overweight and obesity have increased, people are entering older adulthood with another serious, progressive chronic disease to manage. This creates a need for attention and resources by both patients and the interdisciplinary team caring for them.

The good news is that it's a new day for managing body size. Health care providers have the knowledge, tools, and abilities to help people whose weight is not only associated with the development of other chronic diseases but also taking years off their lives.

When the possibility is broached with the patient of making a new weight-loss attempt using contemporary approaches, the medical team must respect the journey that older adults with overweight and obesity have had. As with Charlie in *The Whale*, older adults with larger body sizes have often endured years of criticism, insults, bias, and microaggressions. These are difficult to overcome. They have likely tried to lose weight numerous times on their weight journey through dieting, exercise, and/or pharmacotherapy—only to see the weight regained.

Each interdisciplinary team member has a special role to play in helping older adults map out a plan for getting the healthy nutrition, aerobic and resistance exercise, and health care services they need. Aligning pharmacotherapy with the person's chronic conditions can reduce the possibility of adverse effects, decrease costs, and improve quality of life. Education is needed to understand treatment choices and be ready to make the personal efforts needed to live a healthier, more productive life.

Using new knowledge and interventions now available, older adults with overweight and obesity for the first time in their lives have a realistic hope of getting to the body size they want and staying there. With overweight and obesity affecting the growing number of older adults in the United States and many other countries around the world, these new tools have arrived at a most opportune time.



## Resources for the Health Care Professional, Patient, and Caregiver

### Related Resources From GSA

- [GSA KAER Toolkit for the Management of Obesity in Older Adults](#)
- [Obesity in Older Adults: Succeeding in a Complex Clinical Situation](#)
- [GSA KAER Toolkit for Brain Health, Cognitive Impairment, and Dementia](#)
- [Malnutrition Resources and Infographics](#)
- [Sleep Health](#)
- [GSA Momentum Discussion Podcasts on Overweight and Obesity](#)
- [GSA Journals](#)—*The Journals of Gerontology Series A and Series B, The Gerontologist, Innovation in Aging, Public Policy & Aging Report*

### Other Resources

#### Academy of Nutrition and Dietetics

- [Dietary Intake and Physical Activity Measurement Tool](#) (Academy members only)
- [Section on Weight Management](#)
- [What Resources Are Available to Assist in Assessing Body Weight in Older Adults?](#) (Academy members only)

#### American Academy of Physician Associates

- [Obesity Intake Form](#)
- [Obesity Management in Primary Care Certificate Program: Practice Management and Leadership Training for PAs and NPs](#)

#### American Association of Clinical Endocrinology

- [Nutrition and Obesity](#)

#### American Association of Nurse Practitioners

- [National Obesity Care Week: Increasing Access to Care](#)
- [Obesity Specialty Practice Group](#)

#### American College of Occupational and Environmental Medicine

- [Books and resources on obesity in the workplace; impact on employee costs and absenteeism](#)
- [Obesity in the Workplace: Impact, Outcomes, and Recommendations](#)

#### American College of Physicians

- [Obesity Management Learning Series](#)

#### American Council on Exercise

- [Senior Fitness Specialist Certification Program](#)
- [Take 5 With Dr. Amy Bantham: Move to Live More](#)
- [Fully Vaccinated? Here Are Some Guidelines for Returning to Physical Activity](#)
- [Linking Physical Activity, Therapies and Mindfulness for Healing](#)

#### **American Gastroenterological Association**

- [Obesity Awareness Highlights—Pharmacotherapy and New Initiatives](#)
- [Obesity and How It Affects GI Patients](#)
- [White Paper AGA: POWER—Practice Guide on Obesity and Weight Management, Education, and Resources](#)

#### **American Medical Group Association**

- [Obesity Care Model Collaborative](#) (Association members only)
- [Obesity Care Model Collaborative: Resource Guide](#) (open access)

#### **American Psychological Association**

- [Obesity webpage](#)
- [Links to relevant books such as \*Dieting, Overweight, and Obesity\*](#)

#### **American Society for Metabolic and Bariatric Surgery**

- [General information](#) on older adults, including articles on “older adults” in the Society’s journal, *Surgery for Obesity and Related Diseases*

#### **American Society for Nutrition**

- [Rethinking the problem of long-term weight management](#)

#### **Black Women’s Health Imperative**

- [Diabetes and Prediabetes](#)

#### **Centers for Disease Control and Prevention**

- [Adding Physical Activity as an Older Adult](#)

#### **ConscienHealth**

- [Affiliates and Advocates](#) (networking and research)

#### **Health.gov (website coordinated by the U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion)**

- [Move Your Way Community Resources—Materials for Older Adults](#)
- [Physical Activity Guidelines for Americans Midcourse Report: Implementation Strategies for Older Adults](#)

#### **MedTech Coalition for Metabolic Health**

- Supports view of obesity as a [multifactorial chronic disease](#) requiring a comprehensive approach to prevent and treat
- [Founding members](#) are seca, KORR Medical Technologies, and LEVL

### National Alliance of Healthcare Purchaser Coalitions

- [Obesity Initiative](#); actions for [employers](#) about obesity; benefit design consideration regarding [bariatric surgery](#)

### National Institute of Diabetes and Digestive and Kidney Diseases

- [Stay Fit as You Mature](#) and [Health Tips for Adults](#)
- [Strategic Plan for NIH Obesity Research](#)
- NIDDK-sponsored [clinical trials on overweight and obesity](#)
- [Definition and Facts for Adult Overweight and Obesity](#)
- [Treatment for Overweight and Obesity](#)

### National Institute on Aging

- [Maintaining a Healthy Weight](#)
- [The obesity-linked gene](#)
- [Overcoming Roadblocks to Healthy Eating](#)
- [Healthy Meal Planning: Tips for Older Adults](#)
- [Summaries of studies showing relationships between obesity and conditions such as dementia, sleep, loneliness/social isolation in older people](#)
- [Four types of exercise for improving health and physical ability](#) in older adults: endurance, strength, balance, flexibility

### Obesity Action Coalition

- [Position Statements](#) on a comprehensive medical approach to obesity prevention and treatment, coverage by health insurance as standard benefit, and discrimination and care issues
- [#StopWeightBias Campaign](#)
- [Overview of Advocacy in Obesity](#)

### The Obesity Society

- [Position Statements](#)

### Trust for America's Health

- [The State of Obesity 2020: Better Policies for a Healthier America](#)

### WW

- [Weight Watchers Reimagined](#)
- [Programs](#) on food, activity, sleep, mindset, personal assessment, and behavior change

### Join GSA and Access Members-Only Resources and Communities

Founded in 1945, [GSA](#) is the driving force behind advancing innovation in aging. GSA membership allows you to connect with 5,500 GSA members from more than 50 countries and collaborate in a respected interdisciplinary community to strengthen your career and advance innovation in aging. GSA offers [many benefits](#) to its members, including [multiple opportunities](#) for professional development, networking, leadership, and volunteering throughout the year.

## References

1. Federal Interagency Forum on Aging-Related Statistics. *Older Americans 2020: Key Indicators of Well-Being*. U.S. Government Printing Office; 2020. [https://agingstats.gov/docs/LatestReport/OA20\\_508\\_10142020.pdf](https://agingstats.gov/docs/LatestReport/OA20_508_10142020.pdf)
2. Stierman B, Afful J, Carroll MD, et al. National Health and Nutrition Examination Survey 2017–March 2020 prepandemic data files—Development of files and prevalence estimates for selected health outcomes. *National Health Statistics Reports*, no. 158. National Center for Health Statistics; 2021. <https://dx.doi.org/10.15620/cdc.106273>
3. Spahlholz J, Baer N, König H-H, et al. Obesity and discrimination—a systematic review and meta-analysis of observational studies. *Obes Rev*. 2016;17(1):43–55. doi:10.1111/obr.12343
4. Sutin AR, Stephan Y, Terracciano A. Weight discrimination and risk of mortality. *Psychol Sci*. 2015;26(11):1803–1811. doi:10.1177/0956797615601103
5. Lawrence BJ, Kerr D, Pollard CM, et al. Weight bias among health care professionals: a systematic review and meta-analysis. *Obesity*. 2021;29(11):1802–1812. doi:10.1002/oby.23266
6. Phelan SM, Burgess DJ, Yeazel MW, et al. Impact of weight bias and stigma on quality of care and outcomes for patients with obesity. *Obes Rev*. 2015;16(4):319–326. doi:10.1111/obr.12266
7. George Washington University; STOP Obesity Alliance. Implicit Associations Test: Weight Bias. <https://www.obesitycompetencies.gwu.edu/article/388>
8. George Washington University; STOP Obesity Alliance. *Weight Can't Wait: Guide for the Management of Obesity in the Primary Care Setting*. October 2020. <https://stop.publichealth.gwu.edu/wcw>
9. Obesity Action Coalition. Weight bias: people-first language. 2021. <https://www.obesityaction.org/action-through-advocacy/weight-bias/people-first-language/>
10. Tinetti M, Huang A, Molnar F. The Geriatrics 5Ms: a new way of communicating what we do. *J Am Geriatr Soc*. 2017;65(9):2115. doi:10.1111/jgs.14979
11. Jih J, Mukherjee A, Vittinghoff E, et al. Using appropriate body mass index cut points for overweight and obesity among Asian Americans. *Prev Med*. 2014;65:1–6. doi:10.1016/j.ypmed.2014.04.010
12. Aschner P, Buendia R, Brajkovich I, et al. Determination of the cutoff point for waist circumference that establishes the presence of abdominal obesity in Latin American men and women. *Diabetes Res Clin Pract*. 2011;93(2):243–247. doi:10.1016/j.diabres.2011.05.002
13. ElSayed NA, Aleppo G, Aroda VR, et al. Obesity and weight management for the prevention and treatment of type 2 diabetes: standards of care in diabetes—2023. *Diabetes Care*. 2023;46(suppl 1):S128–S139. doi:10.2337/dc23-S008
14. Grunvald E, Shah R, Hernaez R, et al. AGA clinical practice guideline on pharmacological interventions for adults with obesity. *Gastroenterology*. 2022;163(5):1198–1225. doi:10.1053/j.gastro.2022.08.045
15. Garvey WT, Mechanick JL, Brett EM, et al. American Association of Clinical Endocrinologists and American College of Endocrinology comprehensive clinical practice guidelines for medical care of patients with obesity. *Endocr Pract*. 2016;22(suppl 3):1–203. doi:10.4158/EP161365.GL
16. Batsis JA, Villareal DT. Sarcopenic obesity in older adults: aetiology, epidemiology and treatment strategies. *Nat Rev Endocrinol*. 2018;14(9):513–537. doi:10.1038/s41574-018-0062-9
17. Cappellari GG, Guillet C, Poggiogalle E, et al. Sarcopenic obesity research perspectives outlined by the Sarcopenic Obesity Global Leadership Initiative (SOGLI)—Proceedings from the SOGLI consortium meeting in Rome November 2022. *Clin Nutr*. 2023;42(5):687–699. doi:10.1016/j.clnu.2023.02.018
18. Malmstrom TK, Morley JE. SARC-F: a simple questionnaire to rapidly diagnose sarcopenia [editorial]. *J Am Med Dir Assoc*. 2013;14(8):531–532. doi:10.1016/j.jamda.2013.05.018
19. Pi-Sunyer X, Astrup A, Fujioka K, et al. A randomized, controlled trial of 3.0 mg of liraglutide in weight management. *N Engl J Med*. 2015;373(1):11–22. doi:10.1056/NEJMoa1411892
20. Acosta A, Camilleri M, Dayyeh BA, et al. Selection of antiobesity medications based on phenotypes enhances weight loss: a pragmatic trial in an obesity clinic. *Obesity*. 2021;29(4):662–671. doi:10.1002/oby.23120
21. Cleveland Clinic. 6 worst myths you've ever heard about weight loss. *Health Essentials*. December 26, 2016. <https://health.clevelandclinic.org/6-worst-myths-youve-ever-heard-about-weight-loss/>
22. Newman T. Medical myths: all about weight loss. *Medical News Today*. January 1, 2021. <https://www.medicalnewstoday.com/articles/medical-myths-all-about-weight-loss>
23. Petre A. Do 'calories in vs. calories out' really matter? *Healthline*. June 20, 2019. <https://www.healthline.com/nutrition/calories-in-calories-out#nutrient-density>
24. U.S. Department of Agriculture; U.S. Department of Health and Human Services. *Dietary Guidelines for Americans, 2020–2025*. 9th ed. December 2020. [https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary\\_Guidelines\\_for\\_Americans\\_2020-2025.pdf](https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary_Guidelines_for_Americans_2020-2025.pdf)
25. Centers for Disease Control and Prevention. The surprising truth about prediabetes. July 7, 2022. <https://www.cdc.gov/diabetes/library/features/truth-about-prediabetes.html>
26. Jensen MD, Ryan DH, Apovian CM, et al. 2013 AHA/ACC/TOS guideline for the management of overweight and obesity in adults: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and The Obesity Society. *Circulation*. 2014;129(25 suppl 2):S102–S138. doi:10.1161/01.cir.0000437739.71477.ee



27. Batsis JA, Zagaria AB. Addressing obesity in aging patients. *Med Clin North Am*. 2018;102(1):65–85. doi:10.1016/j.mcna.2017.08.007
28. Centers for Disease Control and Prevention. Physical activity for different groups. July 29, 2021. <https://www.cdc.gov/physicalactivity/basics/age-chart.html>
29. Bauer J, Biolo G, Cederholm T, et al. Evidence-based recommendations for optimal dietary protein intake in older people: a position paper from the PROT-AGE Study Group. *J Am Med Dir Assoc*. 2013;14(8):542–559. doi:10.1016/j.jamda.2013.05.021
30. Weinheimer EM, Sands LP, Campbell WW. A systematic review of the separate and combined effects of energy restriction and exercise on fat-free mass in middle-aged and older adults: implications for sarcopenic obesity. *Nutr Rev*. 2010;68(7):375–388. doi:10.1111/j.1753-4887.2010.00298.x
31. Institute of Medicine. Dietary reference intakes for calcium and vitamin D. The National Academies Press; November 2010. <https://nap.nationalacademies.org/resource/13050/Vitamin-D-and-Calcium-2010-Report-Brief.pdf>
32. Batsis JA, Petersen CL, Clark MM, et al. Feasibility and acceptability of a technology-based, rural weight management intervention in older adults with obesity. *BMC Geriatr*. 2021;21(1):44. doi:10.1186/s12877-020-01978-x
33. Drugs@FDA. U.S. Food and Drug Administration website. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm>
34. Garvey WT, Frías JP, Jastreboff AM, et al. Tirzepatide once weekly for the treatment of obesity in people with type 2 diabetes (SURMOUNT-2): a double-blind, randomised, multicentre, placebo-controlled, phase 3 trial. *Lancet*. 2023;402(10402):613–626. doi:10.1016/S0140-6736(23)01200-X
35. Knop FK, Aroda VR, do Vale RD, et al. Oral semaglutide 50 mg taken once per day in adults with overweight or obesity (OASIS 1): a randomised, double-blind, placebo-controlled, phase 3 trial. *Lancet*. 2023;402(10403):705–719. doi:10.1016/S0140-6736(23)01185-6
36. Rubino D, Abrahamsson N, Davies M, et al. Effect of continued weekly subcutaneous semaglutide vs placebo on weight loss maintenance in adults with overweight or obesity: the STEP 4 randomized clinical trial. *JAMA*. 2021;325(14):1414–1425. doi:10.1001/jama.2021.3224
37. Wadden TA, Hollander P, Klein S, et al. Weight maintenance and additional weight loss with liraglutide after low-calorie-diet-induced weight loss: the SCALE Maintenance randomized study. *Int J Obes (Lond)*. 2013;37(11):1443–1451. doi:10.1038/ijo.2013.120
38. Roderka MN, Puri S, Batsis JA. Addressing obesity to promote healthy aging. *Clin Geriatr Med*. 2020;36(4):631–643. doi:10.1016/j.cger.2020.06.006
39. Benalcazar DA, Cascella M. Obesity surgery preoperative assessment and preparation. *StatPearls (Internet)*. July 31, 2021. <https://www.ncbi.nlm.nih.gov/books/NBK546667/>



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