Individualizing Weight Loss Therapy
Agenda

• Overview of obesity as an “Adiposity-Based Chronic Disease” also known as ABCD¹

• Steps for preventing/managing overweight/obesity
  • Energy deficit meal plans
    • Specific diets
    • Tools: food diaries, apps, monitoring/accountability
  • Physical activity
  • Behavioral modification
  • Circadian rhythm entrainment
  • Anti-obesity medications

Definition of Obesity

- Obesity is a chronic relapsing progressive disease defined by abnormal or excessive adiposity that may impair health.

- Multiple pathophysiological aspects, including genetic, environmental, physiological, and psychological factors.

- Positive energy balance $\rightarrow$ stored as fat in enlarged or more numerous adipocytes & ectopically.

Obes Rev. 2017;18(7):715-723
Endocr Pract 2012;19(5):643-648
Obesity is a Disease

• 2012: AACE asserted that obesity is a disease with multiple pathophysiological aspects including genetic, environmental, physiological and psychological factors
  • Criteria for a disease
    • Impairment of normal functioning
    • Characteristic signs or symptoms
    • Harm or morbidity
• AMA recognized obesity as a disease in 2013

Weight Loss: Overview

- Between 60% to 70% Americans try to lose weight each year.
- Only a small percentage can achieve their goal and maintain weight loss.
- There is no “one size fits all” perfect diet/weight-loss program.
- Optimal program is the one to which patients adheres.
- Obesity is complicated and heterogeneous requiring individualized evaluation and therapy.
Components Effecting Energy Balance

- **Food Environment**
  - Macronutrient composition
  - Availability, Palatability, Cost, Food processing
  - Snacking, Out-of-home meals

- **Additional Triggers**
  - Behavioral: Sleep, smoking
  - Environmental: Ambient temp., CO2, medications, endocrine disruptors, stress, microbiome
  - Psychosocial factors: SES, disparity

- **Physical Activity**
  - Occupational & leisure activity
  - Transportation, mechanization
  - Neighborhood safety
  - Sedentary behaviors

**Genetics**
- Age
- Sex

**Calories In**
- **Food Beverages**
- **Metabolism**

**Calories Out**
- **Physical Activity**

*Obesity (Silver Spring). 2018;26(1):9-10*
Adaptations to Weight Loss: Obesity Protects Obesity

**Eating Behavior Changes**
- ↑ Hunger, preference for calorie dense foods

**Orexigenic Hormones**
- Ghrelin

**Anorexigenic Hormones**
- Leptin, PYY, CCK, GLP-1, amylin, insulin

**Metabolism Changes**
- ↓ Fat oxidation, ↑ cortisol

**Nervous System Changes**
- ↓ SNS activity, increased mesolimbic reward center activity

**Energy Intake**
- ↓ TEE, ↓ REE, ↓ NREE, ↓ T4

**Energy Expenditure**

CCK = cholecystokinin, GLP-1 = glucagon like peptide 1, NREE = nonresting energy expenditure, PYY = peptide YY, SNS = sympathetic nervous system, REE = resting energy expenditure, T4 = thyroxine, TEE = total energy expenditure.

Obesity: **Adiposity-Based Chronic Disease**

- Mechanical complications (excess adiposity in general)
- Cardiometabolic Complications (hypertension, dyslipidaemia, hyperglycaemia, dyslipidemia and hyperglycemia)
- Psychological changes 😞
A Schematic Model of the Intermediary Mechanisms for Dyslipidemia, insulin resistance, T2DM, Heart Disease

Healthy body composition

Subcutaneous fat expansion

- Positive fat balance
- Constitutional limit to subcutaneous fat expansion
- Additional positive fat balance

Hypertension

- Increased vascular volume
- Increased estradiol
- Increased body mass

Breast/Endometrial cancer

Osteoarthritis

Further subcutaneous fat expansion

- Increased cytokine release
- Decreased adiponectin release
- Increased angiotensinogen

Dysfunctional subcutaneous fat

- Increased FFA release
- Decreased TG storage

Ectopic lipids

- Increased portal FFA and IL6

Liver

- Increased glycogen fat
- Increased CRP
- Peripheral insulin resistance

Muscle

- Increased glucose production
- Reduced insulin secretion

β-cells

Diabetes mellitus

Sleep apnea

Islets

Contractile dysfunction

Heart
Obesity as a clinical diagnosis

**ANTHROPOMETRIC COMPONENT OF THE MEDICAL DIAGNOSIS OF OBESITY**
Evidence-based screening and diagnosis for excess adiposity in clinical settings

- **Screening**
- **Annual BMI**

**Diagnosis (Anthropometric Component)**
- BMI $\geq 25$ kg/m$^2$
- BMI $\geq 23$ kg/m$^2$ for some ethnicities

**Clinical Component of Diagnosis**
- BMI $< 25$ kg/m$^2$
- BMI $< 23$ kg/m$^2$ for some ethnicities

1. Clinical interpretation of BMI: Ensure elevated BMI is indicative of excess adiposity by assessing: age, gender, musculature, hydration status, edema, third space fluid collection, large tumors, sarcopenia
2. Waist circumference if BMI < 35: 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.
Obesity is a clinical diagnosis

**Diagnosis**

- **Anthropometric Diagnosis**
  - BMI kg/m²
  - <25: NORMAL WEIGHT
  - ≥25:
    - 25–29.9: OVERWEIGHT
    - ≥30: OBESITY

- **Clinical Diagnosis**
  - Check for elevated BMI indicating excess adiposity
  - Measure waist circumference to evaluate cardiometabolic disease risk

**Checklist of Obesity-Related Complications**
(staging and risk stratification based on complication-specific criteria)

**Diagnostic Categories**

- NORMAL WEIGHT (no obesity)
- OVERWEIGHT BMI 25–29.9
- OBESITY BMI ≥30

**Evaluation**

- Medical history
- Physical examination
- Clinical laboratory
- Review of systems, emphasizing weight-related complications
- Obesity history: graph weight vs age, lifestyle patterns/preferences, previous interventions

https://rdcu.be/bY7FU accessed December 16 2019
Obesity is a clinical diagnosis

**CLINICAL COMPONENT OF THE MEDICAL DIAGNOSIS OF OBESITY**

Evaluate for a checklist of weight-related complications. Candidates for weight-loss therapy can present with either excess adiposity (i.e., the anthropometric component) or weight-related complications (i.e., the clinical component).

<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></td>
<td>Evaluate for overweight or obesity</td>
<td>Metabolic Syndrome</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Type 2 Diabetes</td>
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<tr>
<td></td>
<td></td>
<td>Dyslipidemia</td>
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<td></td>
<td>Hypertension</td>
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<td>Cardiovascular Disease</td>
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<tr>
<td></td>
<td></td>
<td>Nonalcoholic Fatty Liver Disease</td>
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<tr>
<td></td>
<td></td>
<td>Polycystic Ovary Syndrome</td>
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<td></td>
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<td>Female Infertility</td>
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<td></td>
<td></td>
<td>Male Hypogonadism</td>
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<td></td>
<td></td>
<td>Obstructive Sleep Apnea</td>
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<td></td>
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<td>Asthma/Reactive Airway Disease</td>
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<td></td>
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<td>Osteoarthritis</td>
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<td>Urinary Stress Incontinence</td>
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<tr>
<td></td>
<td></td>
<td>Gastroesophageal Reflux Disease</td>
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<td></td>
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<td>Depression</td>
</tr>
</tbody>
</table>
Management of obesity

- Step therapy:
  - Energy deficit meal plan
  - Increased physical activity
  - Behavioral modification
  - Circadian rhythm entrainment
  - Medical management of obesity
  - Devices
  - Surgery

- Therapeutic lifestyle changes combined with any treatment modality enhances weight loss
Efficacy of currently available treatments
Overcoming the stigma of obesity as purely behavioral

### Treatment Goals

#### 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 Component</td>
<td>Clinical Goals</td>
</tr>
<tr>
<td>Clinical Component</td>
<td>Intervention/Weight-Loss Goal</td>
</tr>
</tbody>
</table>

#### 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 |

#### 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  
| | | | • Prevent progressive weight gain  
| | | | • Prevent the development of weight-related complications |

#### TERTIARY PREVENTION

| Overweight or Obesity | Metabolic syndrome | 10% | Prevention of T2DM |
| | Prediabetes | 10% | Prevention of T2DM |
| | T2DM | 5% to ≥15% | • Reduction in A1C  
| | | | • Reduction in number and/or doses of glucose lowering medications  
| | | | • Diabetes remission especially when diabetes duration is short |
| | Dyslipidemia | 5% to ≥15% | • Lower triglycerides  
| | | | • Raise HDL-c  
| | | | • Lower non-HDL-c |

Recommendations 30-63

## Tertiary Prevention

<table>
<thead>
<tr>
<th>Condition</th>
<th>Definition</th>
<th>Prevalence</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overweight or Obesity (BMI ≥ 25 (≥ 23 in certain ethnicities))</td>
<td></td>
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</tr>
<tr>
<td>Hypertension</td>
<td>5% to ≥15%</td>
<td></td>
<td>• Lower systolic and diastolic BP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Reductions in number and/or doses of antihypertensive medications</td>
</tr>
<tr>
<td>Nonalcoholic fatty liver disease</td>
<td>Steatosis</td>
<td>5% or more</td>
<td>Reduction in intrahepatocellular lipid</td>
</tr>
<tr>
<td></td>
<td>Steatohepatitis</td>
<td>10% to 40%</td>
<td>Reduction in inflammation and fibrosis</td>
</tr>
<tr>
<td>Polycystic ovary syndrome</td>
<td></td>
<td>5% to 15%</td>
<td>• Ovulation</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Regularization of menses</td>
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<td></td>
<td></td>
<td>• Reduced hirsutism</td>
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<tr>
<td></td>
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<td></td>
<td>• Enhanced insulin sensitivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Reduced serum androgen levels</td>
</tr>
<tr>
<td>Female infertility</td>
<td></td>
<td>10% or more</td>
<td>• Ovulation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Pregnancy and live birth</td>
</tr>
<tr>
<td>Male hypogonadism</td>
<td></td>
<td>5% to 10%</td>
<td>Increase in serum testosterone</td>
</tr>
<tr>
<td>Obstructive sleep apnea</td>
<td></td>
<td>7% to 11%</td>
<td>• Improved symptomatology</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Decreased apnea-hypopnea index</td>
</tr>
<tr>
<td>Asthma/reactive airway disease</td>
<td></td>
<td>7% to 8%</td>
<td>• Improvement in forced expiratory volume at 1 second</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Improved symptomatology</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td></td>
<td>≥10%</td>
<td>• Improvement in symptomatology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5% to 10%</td>
<td>• Increased function</td>
</tr>
<tr>
<td>Urinary stress incontinence</td>
<td></td>
<td>5% to 10%</td>
<td>Reduced frequency of incontinence episodes</td>
</tr>
<tr>
<td>Gastroesophageal reflux disease</td>
<td></td>
<td>10% or more</td>
<td>Reduced symptom frequency and severity</td>
</tr>
<tr>
<td>Depression</td>
<td>Uncertain</td>
<td></td>
<td>• Reduction in depression symptomatology</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Improvement in depression scores</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.
Structured Obesity Management

- Healthy eating plans
- Physical activity
- Psychological motivation
- Social support
- Circadian disruption
- Medications
# Lifestyle Therapy

**LIFESTYLE THERAPY**

Evidence-based lifestyle therapy for treatment of obesity should include three 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  
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 |
Diets/Health Eating Plans
Federal Guidelines for Diets

- Federal guidelines recommend diets that are:
  - 10% to 35% protein
  - 45% to 65% carbohydrates
  - 20% to 30% fats
- Low-carb diets (<45%) or high-protein diets (>35%)
  - Hard to follow
  - Not more effective
- Consume <10% of calories/day from added sugars
- Consume <10% of calories/day from saturated fats
- Consume <2,300 milligrams (mg)/day of sodium
- If alcohol is consumed, it should be consumed in moderation—up to one drink per day for women and up to two drinks per day for men—and only by adults of legal drinking age.
Selecting a Weight Loss Program

- Matching weight loss program to patient’s needs
  - Patient preferences
  - Comorbid medical conditions
  - Comorbid psychiatric conditions
  - Budgetary considerations
  - Religious considerations
  - Allergies

- Go it alone or with support group?
- Devices (Fitness Tracker only)
- Device plus online community (FitBit® plus My Fitness Pal®)
- Support Group alone (Weight Watchers®)

- What programs has patient already tried?
  - Were they successful or unsuccessful? Why?
  - What did patient like/dislike about prior programs?
Overview of Current Diet Plans

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most balanced plans</td>
<td>Dietary Approaches to Stop Hypertension (DASH) Mediterranean diet</td>
</tr>
<tr>
<td>Low carbohydrate plans</td>
<td>Ketogenic, Atkins, South Beach</td>
</tr>
<tr>
<td>High protein plans</td>
<td>Dukan, Paleo</td>
</tr>
<tr>
<td>Very low-fat plans</td>
<td>Ornish, Pritikin, Weight Watchers</td>
</tr>
<tr>
<td>Vegan vs Plant-based</td>
<td></td>
</tr>
<tr>
<td>Optifast: very-low-calorie diet (VLCD) for limited duration only</td>
<td></td>
</tr>
<tr>
<td>Intermittent fasting plans</td>
<td></td>
</tr>
<tr>
<td>Type of eating pattern</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>USDA Dietary Guidelines For Americans (DGA) (8)</td>
<td>Emphasizes a variety of vegetables from all of the subgroups; fruits, especially whole fruits; grains, at least half of which are whole intact grains; lower-fat dairy; a variety of protein foods; and oils. This eating pattern limits saturated fats and trans fats, added sugars, and sodium.</td>
</tr>
</tbody>
</table>
| Mediterranean-style (69,76,85–91) | Emphasizes plant-based food (vegetables, beans, nuts and seeds, fruits, and whole intact grains); fish and other seafood; olive oil as the principal source of dietary fat; dairy products (mainly yogurt and cheese) in low to moderate amounts; typically fewer than 4 eggs/week; red meat in low frequency and amounts; wine in low to moderate amounts; and concentrated sugars or honey rarely. | ● Reduced risk of diabetes  
● A1C reduction  
● Lowered triglycerides  
● Reduced risk of major cardiovascular events |
| Vegetarian or vegan (77–80,92–99) | The two most common approaches found in the literature emphasize plant-based vegetarian eating devoid of all flesh foods but including egg (ovo) and/or dairy (lacto) products, or vegan eating devoid of all flesh foods and animal-derived products. | ● Reduced risk of diabetes  
● A1C reduction  
● Weight loss  
● Lowered LDL-C and non–HDL-C |
| Low-fat (26,45,80,83,100–106) | Emphasizes vegetables, fruits, starches (e.g., breads/crackers, pasta, whole intact grains, starchy vegetables), lean protein sources (including beans), and low-fat dairy products. In this review, defined as total fat intake ≤30% of total calories and saturated fat intake ≤10%. | ● Reduced risk of diabetes  
● Weight loss |
Table from "Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report."

<table>
<thead>
<tr>
<th>Diet Type</th>
<th>Description</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very low-fat (107–109)</td>
<td>Emphasizes fiber-rich vegetables, beans, fruits, whole intact grains, nonfat dairy, fish, and egg whites and comprises 70–77% carbohydrate (including 30–60 g fiber), 10% fat, 13–20% protein.</td>
<td>Weight loss, Lowered blood pressure</td>
</tr>
<tr>
<td>Low-carbohydrate (110–112)</td>
<td>Emphasizes vegetables low in carbohydrate (such as salad greens, broccoli, cauliflower, cucumber, cabbage, and others); fat from animal foods, oils, butter, and avocado; and protein in the form of meat, poultry, fish, shellfish, eggs, cheese, nuts, and seeds. Some plans include fruit (e.g., berries) and a greater array of nonstarchy vegetables. Avoids starchy and sugary foods such as pasta, rice, potatoes, bread, and sweets. There is no consistent definition of “low” carbohydrate. In this review, a low-carbohydrate eating pattern is defined as reducing carbohydrates to 26–45% of total calories.</td>
<td>A1C reduction, Weight loss, Lowered blood pressure, Increased HDL-C and lowered triglycerides</td>
</tr>
<tr>
<td>Very low-carbohydrate (VLC)</td>
<td>Similar to low-carbohydrate pattern but further limits carbohydrate-containing foods, and meals typically derive more than half of calories from fat. Often has a goal of 20–50 g of nonfiber carbohydrate per day to induce nutritional ketosis. In this review a VLC eating pattern is defined as reducing carbohydrate to &lt;26% of total calories.</td>
<td>A1C reduction, Weight loss, Lowered blood pressure, Increased HDL-C and lowered triglycerides</td>
</tr>
<tr>
<td>Dietary Approaches to Stop Hypertension (DASH) (81,118,119)</td>
<td>Emphasizes vegetables, fruits, and low-fat dairy products; includes whole intact grains, poultry, fish, and nuts; reduced in saturated fat, red meat, sweets, and sugar-containing beverages. May also be reduced in sodium.</td>
<td>Reduced risk of diabetes, Weight loss, Lowered blood pressure</td>
</tr>
<tr>
<td>Paleo (120–122)</td>
<td>Emphasizes foods theoretically eaten regularly during early human evolution, such as lean meat, fish, shellfish, vegetables, eggs, nuts, and berries. Avoids grains, dairy, salt, refined fats, and sugar.</td>
<td>Mixed results, Inconclusive evidence</td>
</tr>
</tbody>
</table>
Mediterranean diet

- Based on foods commonly eaten by Mediterranean populations
  - Fish
  - Mono-unsaturated fats (olives, olive oil)
  - Moderate alcohol consumption allowed
- High-Fiber grains (fruits, vegetables, whole grains, legumes/nuts)
- Benefits: One of best studied approaches for cardiovascular health
  - Linked with CV benefits and prevention of breast cancer, depression, colorectal cancer, diabetes, obesity, asthma, erectile dysfunction, and cognitive decline
## Mediterranean Diet

<table>
<thead>
<tr>
<th>EAT</th>
<th>EAT in Moderation</th>
<th>Rarely Eat</th>
<th>DON’T EAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetables, fruits, nuts, seeds, legumes, spices, fish, seafood and extra virgin olive oil.</td>
<td>Poultry, eggs, cheese and yogurt.</td>
<td>Red meat</td>
<td>Sugar-sweetened beverages, ice cream/candy, added sugars.</td>
</tr>
<tr>
<td>Whole grains, breads, herbs, spices</td>
<td>Alcoholic beverages</td>
<td></td>
<td>Refined grains (white bread, pasta made with refined wheat)</td>
</tr>
<tr>
<td>Lean meats</td>
<td></td>
<td></td>
<td>Processed meat (sausages, hot dogs) and other highly processed foods</td>
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<td></td>
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<td>Refined oils (soybean, canola, cottonseed); trans fats (margarine)</td>
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<td></td>
<td>Highly processed foods: Anything labeled &quot;low-fat&quot; or &quot;diet&quot;, or that looks factory-made.</td>
</tr>
</tbody>
</table>
Ketogenic (Keto) Diet

• Goal: to enable metabolism of fats by drastically reducing carbohydrate intake and replacing it with fat – putting body into ‘ketosis’.
  • Metabolism of ketone bodies becomes main source of body’s energy – instead of metabolizing carbohydrates into glucose
• Very low carbohydrate (25-50gm)
Keto diet

<table>
<thead>
<tr>
<th>FOODS TO EAT</th>
<th>FOODS NOT TO EAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>Whole dairy products (Milk)</td>
</tr>
<tr>
<td>Chicken (dark meat best), turkey or lamb</td>
<td></td>
</tr>
<tr>
<td>Pork</td>
<td></td>
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<tr>
<td>Fatty fish and seafood</td>
<td></td>
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<tr>
<td>Eggs, cheese</td>
<td></td>
</tr>
<tr>
<td>Vegetable oils (avocado, coconut, olive),</td>
<td></td>
</tr>
<tr>
<td>Vegetables</td>
<td>Sauces and dressings</td>
</tr>
<tr>
<td>Avocado</td>
<td></td>
</tr>
<tr>
<td>Berries (blueberries, raspberries, blackberries, etc)</td>
<td>All other fruits</td>
</tr>
<tr>
<td>Nuts and Nut milk</td>
<td>Grains, all sugars, alcohol; cereals, legumes</td>
</tr>
</tbody>
</table>


# Keto Diet: Benefits, Disadvantages

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substantial and fast reductions in body weight, body fat mass, waist circumference</td>
<td>Percentage of carbohydrates is ~10% lower than recommended levels for a healthy diet</td>
</tr>
<tr>
<td>Reduces blood sugar and insulin levels</td>
<td>Reduction in sources of vitamins and minerals possibly leading to nutritional deficiencies</td>
</tr>
<tr>
<td>Easy for patient; good satiety</td>
<td>Reduction in fiber -&gt; digestive problems, constipation</td>
</tr>
<tr>
<td>More adaptable for long term maintenance by adding foods back in</td>
<td>Potential to raise LDL levels in some individuals which may limit usefulness in patients with heart/vascular disease</td>
</tr>
<tr>
<td></td>
<td>Requires a period of adaptation for very physically active/athletic persons</td>
</tr>
</tbody>
</table>
Paleo Diet: benefits, Disadvantages

• Based on how we assume prehistoric humans ate
  • Only includes foods that can be hunted/gathered
  • Doesn’t account for the high level of physical activity involved in hunting/gathering

• Experts have concerns:
  • No whole grains/legumes (good sources fiber, vitamins, nutrients)
  • No dairy (good sources of protein and calcium)

<table>
<thead>
<tr>
<th>FOODS TO EAT</th>
<th>FOODS NOT TO EAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetables, fruits, nuts, seeds, lean meat, fish, eggs,</td>
<td>Grains, legumes, potatoes, dairy,</td>
</tr>
<tr>
<td>Herbs/spices, oils from fruits/nuts</td>
<td>All processed food, trans unsaturated fatty acids (transfats), refined sugars</td>
</tr>
</tbody>
</table>
Plant-based vs Vegetarian vs Vegan Diets

- Plant-based diets may reduce your risk of heart disease, type 2 diabetes, cancer, and premature death.
- Nutritional deficiencies may arise.
Plant-Based Diet

• Mostly plant-based foods: Plants (vegetables, fruits, whole grains, legumes, seeds and nuts) should make up the majority of the diet.

• Limits (but does not require avoiding) animal products

• **No refined foods** (such as added sugar, white flour, processed oils, packaged foods) are allowed.
Vegetarian Diet

- Plant-based diet with more restrictions based on type of diet:
  - **Lacto-vegetarian** diets exclude meat, fish, poultry and eggs, as well as foods that contain them. Dairy products, such as milk, cheese, yogurt and butter, are allowed.
  - **Ovo-vegetarian** diets exclude meat, poultry, seafood and dairy products, but allow eggs.
  - **Lacto-ovo** vegetarian diets exclude meat, fish and poultry, but allows dairy products and eggs.
  - **Pescatarian** diets exclude meat and poultry, dairy, and eggs, but allows fish.
Vegan Diet

Vegans avoid **all** foods of animal origin. These include:

- Meat
- Chicken
- Fish, shellfish
- Eggs, dairy, honey
- Any animal-derived ingredients: albumin, casein, carmine, gelatin, pepsin, shellac, isinglass, and whey.
  - Examples: some types of beer and wine, marshmallows, breakfast cereals, gummy candies and chewing gum.
Low Carb
- High fat, especially "keto"
- Nondiscriminatory sources

Plant-based
- No animal protein
  - vegan/vegetarian

Paleo
- Avoids grains
- Avoids legumes/pulses
- Avoids dairy

Mediterranean
- Lifestyle factors beyond diet
## Nutrients

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Benefit</th>
<th>Where it’s found</th>
<th>How to supplement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>Builds/maintains strong teeth/bones</td>
<td>Milk, dairy foods</td>
<td>Dark green vegetables (kale, collard greens, turnip, broccoli) Fortified or calcium-rich products</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>Bone health</td>
<td>Sun</td>
<td>May need Vitamin D supplement</td>
</tr>
<tr>
<td>Vitamin B-12</td>
<td>Needed to produce red blood cells, prevent anemia</td>
<td>Only found in animal products</td>
<td>Vitamin supplementation</td>
</tr>
<tr>
<td>Protein</td>
<td>Maintains healthy skin, bones, muscles, organs</td>
<td>Eggs, dairy products, sufficient plant-based foods</td>
<td>Soy products, meat substitutes, legumes, lentils, nuts, seeds, whole grains</td>
</tr>
<tr>
<td>Omega-3 fatty acids</td>
<td>Heart health</td>
<td>Grass-fed beef, fish, eggs</td>
<td>Canola oil, soy oil, walnuts, ground flaxseed, soybeans; supplements</td>
</tr>
<tr>
<td>Iron</td>
<td>Red blood cells</td>
<td>All land-based meat, dried beans, peas, lentils, enriched cereals, whole-grain products, dark leafy green vegetables, dried fruit</td>
<td>Vegetarians/vegans need 2X iron vs non-vegetarians; need to eat foods rich in vitamin C to enhance absorption from non-animal sources</td>
</tr>
<tr>
<td>Zinc</td>
<td>Important to enzymes, cell division, formation of proteins</td>
<td>Animal products</td>
<td>Whole grains, soy products, legumes, nuts, wheat germ</td>
</tr>
<tr>
<td>Iodine</td>
<td>Found in thyroid hormones; help regulate metabolism, growth and function of key organs</td>
<td>Seafood</td>
<td>Iodized salt</td>
</tr>
</tbody>
</table>

Caveats: The more restrictive the diet, the more important it is to ensure getting sufficient nutrients.
Time Restricted Eating

• Eating pattern (not diet) which involves cycling between fasted fed state

• Common patterns
  • Daily 16-hour fasts (16/8 or Lean-gains method)
    • Skip breakfast, only eat during 8-hour period (e.g., 11am-7pm)
    • Most common – simplest and easiest to sustain.
  • 5:2 protocol: eat 500–600 calories on 2 non-consecutive days and eat normally the other 5 days

• Intermittent Fasting
  • Twice weekly 24-hour fasts (from dinner to dinner)
Health Benefits of Intermittent Fasting

- Increased levels of Human Growth Hormone (HGH) – helps with fat loss, muscle gain.
- Improvements in insulin sensitivity, substantial decreases in insulin levels → stored body fat becomes more accessible.
- Cells repair themselves: digest and remove old protein that builds up inside cells
- Functional gene changes associated with longevity and protection against disease

Comparing Weight Loss Programs

• Among named diet programs in overweight and obese adults: a meta-analysis

• Study published in JAMA 2014 compared 4 available weight loss programs
  • Found significant weight loss with any low-carbohydrate or low-fat diets
  • Conclusion: “individual weight loss differences between individual named diets were small”¹

• Recommendation: Match individual patient’s needs with appropriate weight loss program

Tools to aid in weight loss and maintenance

- Support groups
- Apps
- Food diaries
- Meal replacements
- Monitoring
- Accountability
Structured obesity management
Healthy Meal Replacement Plans

• Meal replacements (Patients who need external controls)
  • Patient driven
    • OTC meal replacements (shakes or pre-made meals)
  • Clinician driven
    • Direct sales/prescriptive foods (optifast/medifast)
  • Need to have a structured transition plan
Conditions for success

• Engagement with the health team
• Support at home (and at work)
• Patience
• Persistence
• Realism – set goals
  • Beginning today, the weight treatment goal is to lose 5 to 10% of current body weight over the next 6 to 12 months.
  • Perpetual goal until BMI is 18.5 to 24.9

Gonzalez-Campoy et al. Int. J. Endocrinology, May, 2014
Physical Activity
Physical Inactivity: Risks

- Physical inactivity = 4th leading risk factor for death worldwide
  - Physical inactivity: no light to moderate or vigorous leisure-time physical activity of at least 10 minutes a day.
  - Walking less than 1.3 miles or ~3000 steps/day
  - Accounts for >5 million deaths/year
- Physical inactivity linked with:
  - Increased risk coronary heart disease
  - Increased risk type 2 diabetes (T2D)
  - Risk of breast and colon cancers
  - Exacerbations of psychiatric illness
  - Shorter life expectancy

www.who.int/dietphysicalactivity/factsheet_inactivity/en/
Benefits of Physical Activity

- Prevention of weight gain
- Brain benefits:
  - Better cognition
  - Lower depression, anxiety
  - Prevention of dementia
  - Improved sleep
- Reduces many types of cancers
- Reduces blood pressure and HbA1c
- Even 10% increase in PA has important benefits
  - Switching from “inactive” to “somewhat active” (PA 90 min/week) is associated with 15% reduction in mortality risk

CDC Guidelines for Physical Activity (Adults)

• Adults should move more and sit less throughout the day.
• Some PA is better than none:
  • Any amount of moderate-to-vigorous PA affords some health benefits.
• For substantial health benefits:
  • ≥150 – 300 minutes a week of moderate-intensity activity
  • OR 75 – 150 minutes a week of vigorous-intensity aerobic physical activity,
  • OR an equivalent combination of moderate- and vigorous-intensity aerobic activity.
  • Spread aerobic activity throughout the week.
  • PA > 300 minutes/ week of moderate-intensity physical activity increases benefits.
  • Add muscle-strengthening activities (>moderate intensity) involving all major muscle groups on ≥2 days/week.

Structured Obesity Management

Physical Activity

• Daily fitness
  • Need to tailor this to the patient
    • Are there safe outdoor spaces nearby?
    • Do they have access to a facility for free or reasonable cost?
    • Do they have any equipment at home already?

• Training: Match to patient
  • Moderate-intensity continuous training (MICT)
  • Sprint interval training (SIT) or high-intensity interval training (HIIT)

• Office based
  • Create relationships with a local fitness facility
  • Consider putting a facility on site
Physical Activity is More than Exercise

- CDC estimates 53% of adults ≥18 years meet PA guidelines for aerobic PA and 23% meet PA guidelines for aerobic/muscle-strengthening activity.
- It is more important to focus on time per week vs time per day.
- **Exercise vs PA:**
  - Exercise connotes gym, structured activities.
  - PA broadly includes any bodily movement produced by skeletal muscles: Light, Moderate, or Vigorous.
  - PA can include walking the dog, dancing, cleaning the house, gardening.
  - Upper body exercise.
NEAT: Non-exercise activity thermogenesis

Total daily energy expenditure (TDEE) = how body burns energy/expends calories:

1. Basal metabolic rate (BMR; resting metabolism) (60-75% TDEE)
   • Amount of energy body uses to support functions of organs and physiological systems (esp liver, brain, skeletal muscle)

2. Thermic effect of food (TEF; ~10% TDEE)
   • Amount of energy to convert food into energy or store it

3. Thermic effect of physical activity (TEPA; 15-30% TDEE)
   • Amount of energy during/after exercise (eg, as body returns to resting state)
Using NEAT to Reach PA Goals

• Remaining sedentary reduces Lipoprotein Lipase (LPL), which helps convert fat to energy and increases LDL
• Simply standing increases daily caloric expenditure
• Daily steps: US Department of Health promotes 10,000 steps/day as achievable goal
• EASY NEAT Activities: arm circles, stand up, pushups, twists, squats, lunges, shoot imaginary hoops, neck stretches, jumping jacks, balancing on one foot.
## NEAT Activities

<table>
<thead>
<tr>
<th>NEAT Activity</th>
<th>Activity Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk, skate or bicycle instead of driving</td>
<td>Include stretching movements while cooking</td>
</tr>
<tr>
<td>Use stairs instead of elevator/escalator</td>
<td>Stand up every 30 minutes while working</td>
</tr>
<tr>
<td>Clean house a little each day to increase NEAT</td>
<td>Standing desk</td>
</tr>
<tr>
<td>Wash the car</td>
<td>Walk to talk to coworkers rather than email/call</td>
</tr>
<tr>
<td>Play with children and/or pets</td>
<td>Park car as far away from store as possible</td>
</tr>
<tr>
<td>Stretch/move around while watching television</td>
<td>Make more trips from the car when carrying bags</td>
</tr>
</tbody>
</table>
Prescribing Physical Activity

• Type(s) of PA being recommended
• Number of repetitions (if applicable)
• Frequency: How often should activity be performed
• Duration: for how long should activity be performed
• Recommended intensity of activity

• EXAMPLE:
  • Walk briskly for at least 30 minutes 5 days/week or 5000 steps/day
Moderate-intensity continuous training (MCIT)

- Continuous training (continuous exercise) = any type of physical training that involves activity without rest intervals.
  - Can be performed at low, moderate, or high exercise intensities
  - Contrast with (high-intensity) interval training
- Moderate-intensity heart rate zone = 50% to 70% of maximum heart rate
- Recommend 45 min/day X 5 days/week
  - Each session needs to be at least 10 minutes of aerobic activity
- Examples:
  - Brisk walking/easy jogging (outside/on treadmill or elliptical trainer)
  - Bicycling <10 mph, on level ground or with few hills
  - Swimming leisurely, water aerobics
  - Ballroom dancing and line dancing
  - Softball, baseball, volleyball, doubles tennis
  - Gardening and some housework, such as vacuuming
Sprint or High-Intensity Interval Training

- High-intensity interval training (HIIT)
  - High-intensity CV/aerobic exercise all-out for set amount of time, rest for short amount, all-out again – for max of ~20-30 minutes
    - Achieves >90% peak heart rate (in short time)
    - Time efficient strategy (requires ~40% less training time) [Wewege 2017]
  - Provides similar/greater benefits on weight/visceral fat reduction
    - Greater energy expenditure with greater reductions in body fat
  - Can be done in any environment on any equipment
  - Superior cardiovascular fitness adaptations
  - Easily scalable
  - Challenges: Difficult
Behavioral Modification
Therapeutic Lifestyle Change
(Behavior Modification)

- Set realistic individualized achievable goals
- Aim for 5-10% of body weight in 4-6 months
- Set specific behavior goals (e.g. I will walk at lunch 3 times a week)
- Gradually make changes to dietary patterns that are harmful to patient health
- Communication focusing on a healthy lifestyle
- Encourage “physical activity” over “exercise”
Detailed Obesity History Enables Tailored Treatment Recommendations for Patients

• Life Events and Weight Gain
  • Recap of patient life events that coincided with weight gain, such as smoking cessation, medication initiation, pregnancy or menopause, job loss, change in marital status, etc

• Nutrition and Activity
  • Extent of daily physical activity
  • Sleep habits and difficulties
  • Food preferences and frequency/quantity of meals
  • Psychological assessment
    • Mood/anxiety disorders, ADD, PTSD
    • Eating disorders

• Weight Loss Readiness
  • Motivation and social support
  • Psychiatric status
  • Presence of stressful life circumstances
  • Time constraints
  • Goals and expectations

• Review of Systems
  • Checklist of obesity-related complications

Motivational Interviewing (MI)

• MI is a counseling method to help patients identify and resolve ambivalent feelings and insecurities in order to help them become internally motivated to change their behavior.

• Client-centered approach, focused and goal-directed.

• Tools: Reflective listening, autonomy support, shared decision-making, eliciting change talk
5 Principles of Motivational Interviewing

• Express empathy via reflective listening.
• Develop discrepancy between patients' goals or values and their current behavior.
• Avoid argument and direct confrontation.
• Adjust to patient resistance rather than opposing it directly.
• Support self-efficacy and optimism.
Clinician pitfalls

• Shifting blame
  • Focusing on the patient’s failings shifts blame away from clinician responsibility to educate and treat successfully

• Need to recognize weight stability is winning for some patients

• Any fitness improvement impacts on the patient’s overall health/well-being

• Recognize co-morbid condition improvements can be a goal in and of itself

• Meal/Activity/Medication changes have positive impacts beyond weight

• REMEMBER: Saboteurs are very real and need to be addressed before they derail the patient
Motivating for the Long-Term: Attention

- Individual, group, motivational apps
- Patient tactics
- Clinician tactics
- Support networks
  - Patient support
  - Support staff
  - Support for care partners
Feeding is a behavior

- What we eat
- Where we eat
- When we eat
- Who we eat with
- How much we eat

These are all learned behaviors and can always be re-learned.
Circadian Rhythm Entrainment
Role of Circadian Rhythms and Weight Loss

- Circadian rhythms: “biological activity rhythm driven by internal circadian clocks (~24 hours) that are entrained by external signals”¹
- Entrainment: synchronizing/aligning internal biologic clock rhythm to external cues (eg, natural light/dark cycles)
- Regulate sleep-wake cycles, organize metabolic functioning to optimize metabolic efficiency²
- Many pituitary hormones are circadian³
  - Cortisol and sex hormones (morning high)
  - Thyroid stimulating hormone (evening high)
  - Prolactin, growth hormones (evening highs)
- There are circadian rhythms in glucose, insulin, glucose tolerance, lipid levels, appetite, energy expenditure²,₄,₅
  - Circadian rhythms also found in how people respond to stress and exercise
- Disrupting circadian rhythms influences metabolic disease, cancer, gut microbiome, and has been linked with obesity, stress, diabetes and cardiovascular disease.¹,³

Role of Circadian Rhythms and Weight Loss (continued)

- Circadian rhythms influence metabolism and energy expenditure
  - Influence timing of digestion, nutrient uptake, and metabolism
- When food is eaten affects weight loss
  - Eating in the morning allows calories to be used more efficiently than eating in the evening\(^1\)
- Entrainment = retraining internal clocks to align with external time cues (e.g., moonlight or sunshine).
  - Timing exercise to synchronize with appropriate phase/amplitude of circadian clock may potentially prevent diseases\(^2\)
  - Timing food intake to optimize digestion and metabolism may help support weight loss.\(^1\)

## Effects of Medications on Weight

<table>
<thead>
<tr>
<th>Category</th>
<th>Promote Weight Gain</th>
<th>Promote Weight Loss or Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antipsychotics/Neurologic Agents</td>
<td>Antipsychotics</td>
<td>Ziprasadone (Geodon)</td>
</tr>
<tr>
<td></td>
<td>Antidepressants</td>
<td>Citalopram (Celexa)</td>
</tr>
<tr>
<td></td>
<td>Lithium</td>
<td>Bupropion (Wellbutrin)</td>
</tr>
<tr>
<td></td>
<td>Antiepileptic</td>
<td>Topiramate (Topamax)</td>
</tr>
<tr>
<td>Steroid hormones</td>
<td>Prednisone/prednisolone</td>
<td>Estrogen, progestins</td>
</tr>
<tr>
<td></td>
<td>Oral contraceptives</td>
<td></td>
</tr>
<tr>
<td>Diabetic agents</td>
<td>Sulfonylureas, Thiazolidinediones,</td>
<td>Metformin, GLP-1 agonists, Pramlintide, α-glucosidase inhibitors, SGLT-2 inhibitors</td>
</tr>
<tr>
<td></td>
<td>Insulin</td>
<td></td>
</tr>
<tr>
<td>Antihypertensive agents</td>
<td>Beta-adrenergic blockers</td>
<td>ACE inhibitors</td>
</tr>
<tr>
<td>Asthma-related medications</td>
<td>Antihistamines</td>
<td>Inhalers</td>
</tr>
<tr>
<td>Pain medication</td>
<td>Opioids</td>
<td></td>
</tr>
</tbody>
</table>
Medications and Surgery
Optimizing Weight Reduction

- **Nutritional education**
  - Basic macronutrients and calories
  - Sources of healthy food choices
    - Must be economical options
  - Better methods of cooking
  - Restaurant options (even fast food)
- **Physical Activity education**
  - Tailored to their geography/ability
  - Access to trainers
  - Cheap/free options
- **Psychological education**
  - Switching out good habits for bad
  - Understanding saboteurs

- **Medications with indications to treat obesity**
  - Phentermine
  - Phentermine/topiramate ER
  - Naltrexone/Bupropion ER
  - Liraglutide
- **Related therapies**
  - Metformin
    - Must give B complex/B12
  - GLP-1 agonists
  - Pramlintide
  - Topiramate
Rationale for Treatment of Obesity with Medications

• Obesity is a chronic disease.
• Most chronic diseases are treated with medications (ie. diabetes, hypertension, hyperlipidemia).
• The biochemistry of people with obesity is different than that of lean people.
• When people with obesity lose weight their biochemistry does not become the same as lean people.
• Medications change biochemistry.
• Hypothalamus as a thermostat
Criteria for Anti-obesity Medications

BMI $\geq 27$ kg/m$^2$ with at least one comorbidity
BMI $\geq 30$ kg/m$^2$ with or without comorbidity

Always as an adjunct to an energy-deficit meal plan, increased physical activity and behavior modification.
### Initiate Changes

<table>
<thead>
<tr>
<th><strong>INITIATE LIFESTYLE THERAPY</strong></th>
<th><strong>INITIATE WEIGHT LOSS MEDICATION AS AN ADJUNCT TO LIFESTYLE THERAPY</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. No Complications.</strong></td>
<td><strong>1. Failure to lose weight.</strong></td>
</tr>
<tr>
<td>Patients with overweight or obesity who have no clinically significant weight-related complications (secondary prevention)</td>
<td>Add medication for patients who have progressive weight gain or who have not achieved clinical improvement in weight-related complications on lifestyle therapy alone.</td>
</tr>
<tr>
<td><strong>2. Mild to Moderate Complications.</strong></td>
<td><strong>2. Weight Regain on Lifestyle Therapy.</strong></td>
</tr>
<tr>
<td>- Patient with mild to moderate weight-related complications when lifestyle therapy is anticipated to achieve sufficient weight loss to ameliorate the complication (tertiary prevention)</td>
<td>Add medication for patients with overweight (BMI 25 to 29.9 kg/m²) or obesity who are experiencing weight regain following initial success on lifestyle therapy alone.</td>
</tr>
<tr>
<td>- Note: weight-loss medications may also be indicated based on clinical judgment</td>
<td><strong>3. Presence of Weight-Related Complications.</strong></td>
</tr>
<tr>
<td></td>
<td>Initiate medication concurrent with lifestyle therapy for patients with overweight (BMI to 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).</td>
</tr>
</tbody>
</table>
Role of Medications in Weight Loss

• Medications do not work on their own.
• Medications amplify the effects of behavioral changes to produce consumption of fewer calories.
• Addition of a medication to a comprehensive weight loss program produces an additive effect.
Complications-Centered Model

**COMPLICATIONS-CENTRIC MODEL FOR CARE OF THE PATIENT WITH OVERWEIGHT/OBESITY (ADIPOSITY-BASED CHRONIC DISEASE)**

**STEP 1**
**EVALUATION FOR COMPLICATIONS AND STAGING**

- **BMI <25**
  - NO OVERWEIGHT OR OBESITY
  - NO COMPLICATIONS

- **BMI ≥25**
  - OVERWEIGHT OR OBESITY
  - **COMPLICATIONS**
    - **MILD TO MODERATE**
    - **SEVERE**

**STAGE 0**
Therapeutic targets for improvement in complications

**STAGE 1**
Treatment modality

**STAGE 2**
Treatment intensity based on staging

**STEP 2**
**SELECT:**
- **Lifestyle Therapy:** Physician/RD counseling, web/remote program, structured multidisciplinary program
- **Medical Therapy (BMI ≥27):** Individualize care by selecting one of the following based on efficacy, safety, and patients' clinical profile: phentermine, orlistat, lorcaserin, phentermine/topiramate ER, naltrexone/bupropion, liraglutide 3 mg
- **Surgical Therapy (BMI ≥35):** Endoscopic procedures, gastric banding, sleeve, or bypass

**STEP 3**
If therapeutic targets for complications not met, intensify lifestyle, medical, and/or surgical treatment modalities for greater weight loss. Obesity is a chronic progressive disease and requires commitment to long-term therapy and follow-up.
Surgery Overview

- Four weight loss surgical options are available
  - Laparoscopic adjustable gastric band (LAGB)
  - Laparoscopic sleeve gastrectomy (LSG)
  - Biliopancreatic diversion with or without duodenal switch (BPD-DS) and with or without LSG (ie, staged BPD)
  - Roux-en-Y gastric bypass (RYGB)
- Weight loss and associated benefits: BPD-DS and RYGB>LSG>LAGB
- Post-surgical morbidity: RYGB and BPD-DS>LSG>LAGB
- Surgical candidates should be selected carefully with consideration of psychosocial as well as medical factors
- Nutritional and metabolic follow-up are vital to ensure positive outcomes.

or go to Disease States/Resources/Nutrition and Obesity/Slide Libraries/Bariatric Surgery
## Evaluation

### Evaluation for Complications and Staging

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Cardiometabolic Disease</th>
<th>Biomechanical Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI &lt;25</td>
<td>No Complications</td>
<td>Complications</td>
</tr>
<tr>
<td></td>
<td>No Overweight or Obesity</td>
<td>BMI ≥25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overweight or Obesity</td>
</tr>
<tr>
<td></td>
<td>Stage 0</td>
<td>Stage 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stage 2</td>
</tr>
</tbody>
</table>

### Step 2: Select

- **Therapeutic targets for improvement in complications**
- **Treatment modality**
- **Treatment intensity based on staging**

- **Lifestyle Therapy:** Physician/RD counseling, web/remote program, structured multidisciplinary program

- **Medical Therapy (BMI ≥27):** Individualize care by selecting one of the following based on efficacy, safety, and patients’ clinical profile: phentermine, orlistat, lorcaserin, phentermine/topiramate ER, naltrexone/bupropion, liraglutide 3 mg

- **Surgical Therapy (BMI ≥35):** Gastric banding, sleeve, or bypass
<table>
<thead>
<tr>
<th>CLINICAL CHARACTERISTICS OR CO-EXISTING DISEASES</th>
<th>MEDICATIONS FOR CHRONIC WEIGHT MANAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Orlistat</td>
</tr>
<tr>
<td>Diabetic Prevention (metabolic syndrome, prediabetes)</td>
<td></td>
</tr>
<tr>
<td>Type 2 Diabetes Mellitus</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>Monitor heart rate</td>
</tr>
<tr>
<td>Cardiovascular Disease</td>
<td>Monitor heart rate</td>
</tr>
<tr>
<td>CAD</td>
<td>Insufficient data</td>
</tr>
<tr>
<td>Arrhythmia</td>
<td>Monitor heart rate, rhythm</td>
</tr>
<tr>
<td>CHF</td>
<td>Insufficient data</td>
</tr>
<tr>
<td>Chronic Kidney Disease</td>
<td>Do not exceed 7.5 mg/46 mg per day</td>
</tr>
<tr>
<td>Mild (50–79 mL/min)</td>
<td>Watch for oxalate nephropathy</td>
</tr>
<tr>
<td>Moderate (30–49 mL/min)</td>
<td>Calcium oxalate stones</td>
</tr>
<tr>
<td>Severe (&lt;30 mL/min)</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Nephrolithias</td>
<td></td>
</tr>
<tr>
<td>Hepatic Impairment (Child-Pugh 5–9)</td>
<td>Watch for cholelithias</td>
</tr>
<tr>
<td>Severe (Child-Pugh &gt;9)</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Depression</td>
<td>Avoid maximum dose: 15 mg/92 mg per day</td>
</tr>
<tr>
<td>Condition</td>
<td>Max Dose / ER Dose</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Avoid max dose: 15 mg/92 mg per day</td>
</tr>
<tr>
<td>Psychoses</td>
<td>Insufficient data</td>
</tr>
<tr>
<td>Binge Eating Disorder</td>
<td>Insufficient data; however, possible benefit based on studies with topiramate</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>Contraindicated, may trigger angle closure</td>
</tr>
<tr>
<td>Seizure Disorder</td>
<td>If discontinuing from max dose, taper slowly</td>
</tr>
<tr>
<td>Pancreatitis</td>
<td>Monitor for symptoms</td>
</tr>
<tr>
<td>Opioid Use</td>
<td>Will antagonize opioids and opiates</td>
</tr>
<tr>
<td>Women of Reproductive Potential</td>
<td>Use contraception and discontinue orlistat should pregnancy occur</td>
</tr>
<tr>
<td>Age ≥65 years *</td>
<td>Limited data available</td>
</tr>
<tr>
<td>Alcoholism/Addiction</td>
<td>Insufficient data</td>
</tr>
<tr>
<td>Post-Bariatric Surgery</td>
<td>Insufficient data</td>
</tr>
</tbody>
</table>

* 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.
Contributors

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