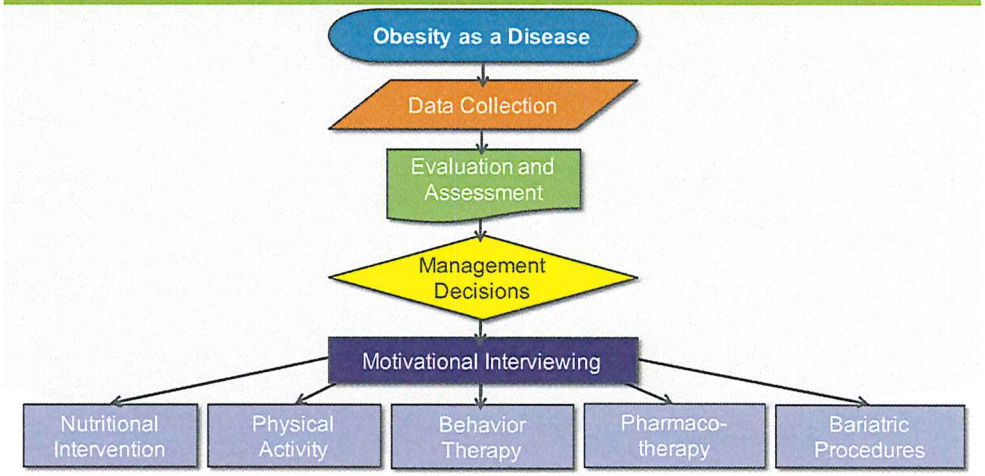
Obesity Algorithm®

Modified for educational purposes
By Carlos Jordan MD
Member of the OMA

obesitymedicine.org

Obesity Medicine Association
CLINICAL LEADERS IN OBESITY MEDICINE®

Obesity Algorithm

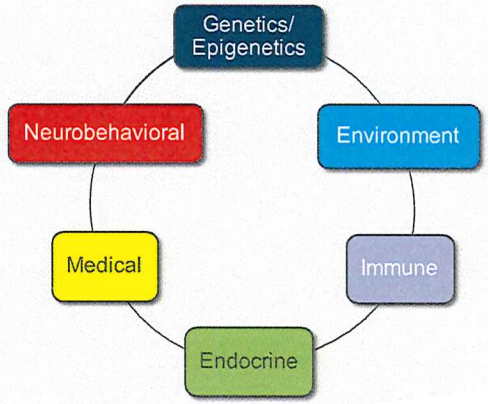


The Obesity Medicine Association's Definition of Obesity

"Obesity is defined as a chronic, relapsing, multi-factorial, neurobehavioral disease, wherein an increase in body fat promotes adipose tissue dysfunction and abnormal fat mass physical forces, resulting in adverse metabolic, biomechanical, and psychosocial health consequences."

Obesity Medicine Association

Obesity as a Multifactorial Disease



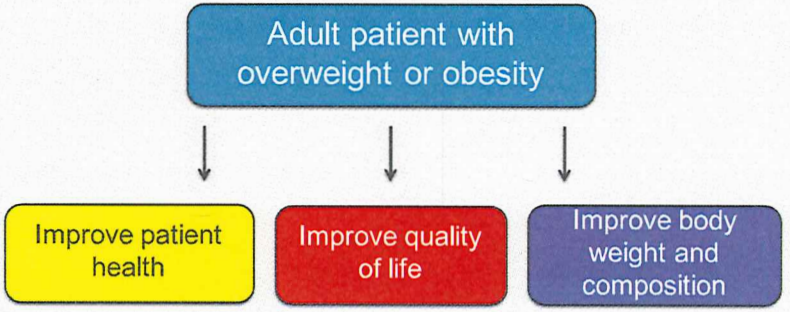
Obesity Medicine Association

Overall Obesity Management Goals

obesitymedicine.org

Obesity Medicine Association
CLINICAL LEADERS IN OBESITY MEDICINE

Overall Management Goals



Obesity Medicine Association

Within Subsets of Patients with Overweight and/or Obesity

Deranged endocrine and immune responses

Sick Fat Disease (SFD) (Adiposopathy)

Endocrine/metabolic:
- Elevated blood glucose
- Elevated blood pressure
- Dyslipidemia
- Other metabolic diseases

Abnormal and pathologic physical forces

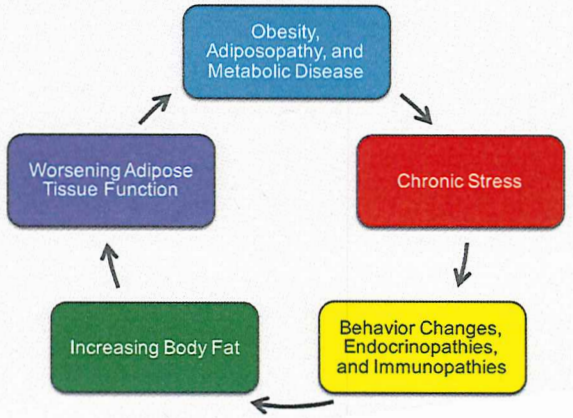
Fat Mass Disease (FMD)

Biomechanical/structural:
- Stress on weight-bearing joints
- Immobility
- Tissue compression (i.e., sleep apnea, gastrointestinal reflux, high blood pressure, etc.)
- Tissue friction (i.e., intertrigo, etc.)

References: [1] [2] [3] [4] [5] [6] [7]

Obesity Medicine Association

Adiposopathy Stress Cycle



Obesity Medicine Association

Patient Evaluation:
History and physical examination

obesitymedicine.org

Obesity Medicine Association
CLINICAL LEADERS IN OBESITY MEDICINE

Nutrition History

Meals and Snacks

- Timing
- Frequency (via questionnaire)
- Nutritional content
- Preparer of food
- Access to foods
- Location of home food consumption (i.e., eating area, television, computer, etc.)
- Location of away food consumption (i.e., workplace restaurants, fast food, etc.)

Behavior

- Previous nutritional attempts to lose weight and/or change body composition
  - If unsuccessful or un-sustained, what were short- and long-term barriers to achieving or maintaining fat weight loss
- Triggers (hunger, cravings, anxiety, boredom, reward, etc.)
- Nighttime eating
- Binge eating
- Emotional eating
- Family/cultural influences
- Community influences
- Readiness for change

Records

- Food and beverage diary, including type of food or beverage consumed and amount consumed
  - 72-hour recall
  - Keep food and beverage record for a week and return for evaluation
- Electronic application tools

Reference/s: [56] [57] [61]

Obesity Medicine Association

Physical Activity History

- Success and/or failure of previous physical activity/exercise efforts
- Current mobility and equipment needs
- Current physical activity/exercise status
- Current fitness level or endurance capacity
- Access to locations amenable to increased physical activity/exercise (i.e., gym, workplace, exercise facilities, urban or rural home setting)
- Physical activity/exercise preferences

Reference/s: [58] [59] [60]

Obesity Medicine Association

Patient Evaluation:
Laboratory and Diagnostic Testing

obesitymedicine.org

Obesity Medicine Association
CLINICAL LEADERS IN OBESITY MEDICINE

Laboratory: Routine

Adiposity-relevant Blood Testing

- Fasting blood glucose and insulin
- Hemoglobin A1c
- Fasting lipid panel /NMR
- Liver Panel
- Electrolytes (i.e., potassium, sodium, calcium, phosphorous, etc.)
- Renal blood testing (i.e., creatinine, blood urea nitrogen, etc.)
- Uric acid
- Thyroid stimulating hormone (TSH)
- Vitamin D levels

General Laboratory Testing

- Complete blood count
- Urinalysis
- Urine for microalbumin

References: [21] [57] [61]

Obesity Medicine Association

Diagnostic Testing: Individualized

Body Composition

- DEXA
- Bioelectric impedance
- Near-infrared interactance
- Myotape measurements
- Caliper percent body fat measurements (e.g., three-site skinfold calculations)
- Underwater weighing
- Quantitative magnetic resonance (QMR)
- Computerized tomography (single slice or volume method)

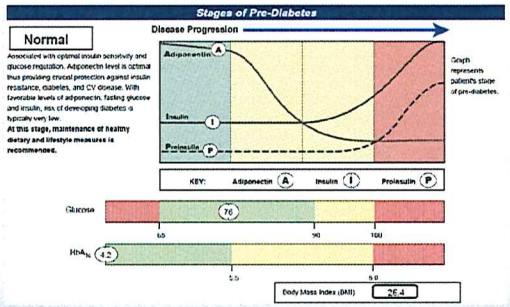
Emerging Science Testing

- Leptin
- Adiponectin
- Leptin-to-adiponectin ratio
- Free fatty acids
- Immune markers
  - Tumor necrosis factor
  - Interleukin 1 and 6
- Infectious testing
  - Gut microbiota
  - Adenovirus (36) assays
  - Evaluation for other microbes

References: [16] [67] [68] [69] [70] [71] [72]

Obesity Medicine Association

Optimal Function



Intervention = Maintenance of healthy diet & lifestyle

Obesity Medicine Association

Treatment

Obesity Medicine Association
CLINICAL LEADERS IN OBESITY MEDICINE

Treatment of Adult Patients with Overweight or Obesity

Medical Management and Coordination

- Nutrition
- Physical Activity
- Behavior Therapy
- Pharmacotherapy
- Bariatric Surgery

Concurrent Medications (iatrogenic obesity)

Identify and Manage Concomitant Pharmacotherapy That Might Alter Body Weight

Cardiovascular Medications

May increase body weight:
- **Some beta-blockers**
  - **Propranolol**
  - **Atenolol**
  - **Metoprolol**
- **Dihydropyridine ("dipine") calcium channel blockers**
  - **Nifedipine**
  - **Amlodipine**
  - **Felodipine**

Diabetes Mellitus Medications

May increase body weight:
- **Most insulins**
- **Sulfonylureas**
- **Thiazolidinediones**
- **Meglitinides**

May decrease body weight:
- Metformin
- Glucagon-like peptide-1 agonists
- Sodium glucose co-transporter 2 inhibitors
- Alpha glucosidase inhibitors

References: [7] [18] [63] [76]

Identify and Manage Concomitant Pharmacotherapy That Might Alter Body Weight

Hormones

May increase body weight:
- **Glucocorticoids**
- **Estrogens**

Variable effects on body weight:
- **Progestins**
  - **Injectable or implantable progestins may have greatest risk for weight gain**
  - **May be dependent upon the individual**
- Testosterone
  - May reduce percent body fat and increase lean body mass, especially if used to replace testosterone deficiency in men

Anti-seizure Medications

May increase body weight:
- **Carbamazepine**
- **Gabapentin**
- **Valproate**

May decrease body weight:
- Lamotrigine
- Topiramate
- Zonisamide

References: [18] [79] [80] [81] [82] [83][84]

Identify and Manage Concomitant Pharmacotherapy That Might Alter Body Weight

May increase body weight:
- **TCAs**
  - **Amitriptyline**
  - **Doxepin**
  - **Imipramine**
- **SSRIs (e.g. paroxetine)**
- **MAOi**
  - **Isocarboxazid**
  - **Phenelzine**
- **Mirtazapine**

May decrease body weight:
- **Bupropion**

Variable effects on body weight:
- TCAs
  - Desipramine
  - Nortriptyline
  - Protriptyline
- SSRIs
  - Citalopram
  - Escitalopram
  - Fluoxetine
  - Sertraline
- SSRNIs
  - Desvenlafaxine
  - Duloxetine
  - Venlafaxine
- MAOi (i.e., tranylcypromine)

References: [18] [79] [80] [81]

Identify and Manage Concomitant Pharmacotherapy That Might Alter Body Weight

Mood Stabilizers

May increase body weight:
- **Gabapentin**
- **Lithium**
- **Valproate**
- **Vigabatrin**

Variable/neutral effects on body weight:
- Carbamazepine (sometimes reported to increase body weight)
- Lamotrigine (sometimes reported to decrease body weight)
- Oxcarbazepine

Migraine Medications

May increase body weight:
- **Amitriptyline**
- **Gabapentin**
- **Paroxetine**
- **Valproic acid**
- **Some beta-blockers**

May decrease body weight:
- **Topiramate**

References: [18] [79] [80] [81] [82]

Identify and Manage Concomitant Pharmacotherapy That Might Alter Body Weight

Antipsychotics

May substantially increase body weight:
- **Clozapine**
- **Olanzapine**
- **Zotepine**

May somewhat increase body weight:
- **Asenapine**
- **Chlorpromazine**
- **Iloperidone**
- **Paliperidone**
- **Quetiapine**
- **Risperidone**
- **Sertindole**
- **Lithium**

Variable/neutral effects on body weight:
- Amisulpride
- Aripiprazole
- Haloperidol
- Lurasidone
- Ziprasidone

Hypnotics

May increase body weight:
- **Diphenhydramine**

May have limited effects on body weight:
- Benzodiazepines
- Melatonergic hypnotics
- Trazodone

References: [18] [79] [80] [81]

Principles of Healthy Nutrition

Limit:
- **Highly processed foods of minimum nutritional value: sweets, "junk foods," cakes, cookies, candy, pies, chips**
- **Energy-dense beverages: sugar-sweetened beverages, juice, cream**

Encourage:
- **Consumption of healthy proteins and fats, vegetables, leafy greens, fruits, berries, nuts, legumes**
- **Complex carbohydrates over simple sugars: Low glycemic index over high glycemic index foods**
- **High-fiber foods over low-fiber foods**
- **Reading labels rather than marketing claims**

Managing the *quality* of calories is important when reducing the quantity of calories, such as during weight loss.

References: [88] [91]

Nutritional Therapy for Obesity

obesitymedicine.org

Obesity Medicine Association
CLINICAL LEADERS IN OBESITY MEDICINE®

Nutritional Therapy for Obesity

Factors related to improved outcomes:

- Evidence-based
- Quantitative
- Qualitative
- Patient preference
- Patient adherence

References: [8] [91] [92]

Obesity Medicine Association

Choosing Nutritional Therapy for Obesity

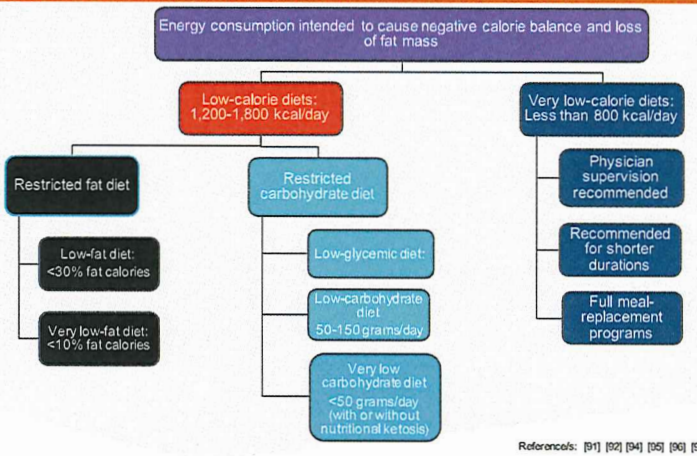
The most appropriate nutritional therapy for weight loss should be safe, effective, and one to which the patient can adhere.

- Consider the following:
  - Individual food preferences, eating behaviors, and meal patterns
  - Cultural background, traditions, and food availability
  - Time constraints and financial issues
  - Nutritional knowledge and cooking skills

References: [8] [89] [91] [92]

Obesity Medicine Association

Nutritional Therapy for Obesity



References: [91] [92] [94] [95] [96] [97] [509]

Obesity Medicine Association

Low-calorie Diets: Restricted Carbohydrate Diet

Low carbohydrate diet defined as 50-150 grams of carbohydrates per day.
Very low carbohydrate diet defined as <50 grams of carbohydrates per day.

Weight Loss

- May produce modestly greater weight loss compared to fat-restricted dietary intake for the first 6 months, wherein afterwards, the net weight loss may be similar to other calorie restricted nutritional interventions
- May assist with reducing food cravings

Metabolic Effects

- Reduces fasting glucose, insulin and triglycerides
- Modestly increases high-density lipoprotein cholesterol levels
- May increase low-density lipoprotein cholesterol levels
- May modestly reduce blood pressure
- The metabolic effects noted above may occur with or without weight loss
- In patients with epilepsy, a very low carbohydrate ketogenic diet (VLCKD) may reduce seizures
- LCKD may possibly improve diabetes mellitus complications (i.e., nephropathy)

Risks

- May produce carbohydrate cravings within the first few days of implementation, which may be mitigated by adding low-glycemic-index foods
- May induce gout flare if history of gout

Reference/s: [94] [95]

Low-calorie Diets: Restricted Fat Diet

Defined as 10-30 percent of total calories from fat.

Weight Loss

- After six months, fat-restrictive, low-calorie nutritional intervention generally produces the same amount of weight loss compared to the "low-carb diet"

Metabolic Effects

- May reduce fasting glucose and insulin levels
- Modestly decreases low-density and high-density lipoprotein cholesterol levels
- May modestly reduce blood pressure

Risks

- Hunger control may present challenges, which may be mitigated with weight-management pharmacotherapy
- If fat restriction results in a substantial increase in carbohydrate consumption, and if weight loss is not achieved, an increase in carbohydrate dietary intake may potentially contribute to hyperglycemia, hyperinsulinemia, hypertriglyceridemia, and reduced levels of high-density lipoprotein cholesterol

Reference/s: [21] [22] [96]

Very Low-calorie Diets

Defined as less than 800 kcal/day, typically implemented utilizing specifically formulated meal-replacement products *supervised by a trained clinician.*

Weight Loss

- Produces more rapid weight loss than low calorie (low-fat or carbohydrate restricted) diets due to the lower energy intake

Metabolic Effects

- Reduces fasting glucose, insulin and triglycerides
- May modestly increase high-density lipoprotein cholesterol levels
- May modestly decrease low-density lipoprotein cholesterol
- Reduces blood pressure

Risks

- Fatigue, nausea, constipation, diarrhea, hair loss, and brittle nails
- Cold intolerance, dysmenorrhea
- Small increase in gallstones, kidney stones, gout flare
- If insufficient mineral intake, then may predispose to palpitations and cardiac dysrhythmias, muscle cramps
- Weight regain *will* occur if patients are not taught how to maintain healthy eating

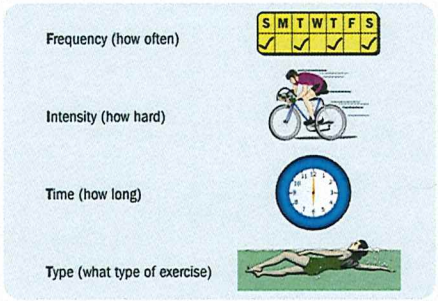
Reference/s: [97] [98] [99] [509]

Physical Activity

obesitymedicine.org

Medical Evaluation to Ensure Safety before Beginning New Exercise Program

- Exercise prescription (FITTE)
  - Frequency
  - Intensity
  - Time spent
  - Type
  - Enjoyment level



Reference/s: [104]

Assess Mobility

Unable to Walk

- Seated exercise program
- Arm exercises (i.e., arm cycling)
- Swimming/aquatic exercises (e.g., shallow or deep water exercises)
- Gravity-mediated physical activity
- Consider physical therapy evaluation
  - Recommend rehabilitation & physical therapy guided activity program
  - Set physical activity goals
  - Assess special equipment needs

Limited Mobility, Able to Walk

- Walking
- Swimming/aquatic exercises (e.g., shallow or deep water exercises)
- Gravity-mediated physical activity
- Assess for special equipment needs

No Substantial Limitations to Mobility

- Exercise/physical activity prescription plan driven by patient and guided by clinician
- Assess for special equipment needs

Reference/s: [105] [106]

Priority: Increase Energy Expenditure

Dynamic (Aerobic) Training

- Some physical activity is better than none
- At least 150 minutes (2.5 hours) per week of moderate physical activity or at least 75 minutes (1.25 hours) per week of vigorous intensity aerobic exercise = most health benefits, promote modest weight loss, and prevent weight gain
- > 300 minutes (5 hours) per week of moderate physical activity or 150 minutes (2.5 hours) per week of vigorous intensity aerobic exercise = promote more robust weight loss and prevent weight regain after weight loss

Resistive (Anaerobic) Strength Training

- Percent body fat better assessment of body composition than BMI
- Utilize appropriate weight lifting technique
- Emphasize "core" muscle exercises
- Using a variety of free weights, machines, and resistance bands may elicit less boredom and provide greater flexibility regarding scheduling and location
- Short-term sore muscles may be expected

Reference/s: [107]

Priority: Increase Energy Expenditure and Decrease Sedentary Time

Leisure Time Physical Activity

- Engage in competitive sport activities involving substantial physical activity, especially if willing to do so on a routine basis
- Engage in non-competitive sports such as running, hiking, cycling, cross-fit training, etc.
- Outdoor warm weather physical activity in sunlight may facilitate negative caloric balance and have other health benefits, but need to avoid excessive sun exposure
- Engage in physical activity sport-alternatives, such as dancing

Transportational/Occupational Non-exercise Activity Thermogenesis (NEAT)

- Walk short distances instead of automated transportation
- Take stairs instead of elevator
- Carry overnight travel bags instead of using rollers
- Active work environment (i.e., standing desks, walking desks)
- Avoid prolonged inactivity
  - Take breaks from inactivity
  - Walk, stand, incidental movements

Reference/s: [108] [109]

Motivational Interviewing

obesitymedicine.org

Obesity Medicine Association
CLINICAL LEADERS IN OBESITY MEDICINE

Micro-Counseling (OARS)

Open-ended Questions
- May help patient explore reasons for and possibility of change

Affirmation
- An expressed recognition of the patient's strengths and how these strengths can be applied to implement favorable change
- Affirmations to the patient by the clinician should be:
  - Relevant
  - Genuine

Reflections
- Careful listening can often be the most effective form of empathy

Summaries
- Each counseling session should conclude with a summary of:
  - What was discussed
  - Shift attention from negative past failures and toward positive but realistic future goals
  - Establish metrics to measure success of future goals
  - Outline follow-up plans

Reference/s: [112]

Obesity Medicine Association

Change Metric Examples

Importance of Change
- *"On a scale of 1-10, where one is not important and 10 is most important, how important is it for you to change?"*
- *"Why are you not at a lower/higher number?"*

Readiness to Change
- *"On a scale of 1-10, where one is not ready to change and 10 is absolutely ready to change, how ready are you to change?"*
- *"Why are you not at a lower/higher number?"*

Confidence in Ability to Change
- *"On a scale of 1-10, where one is not at all confident and 10 is absolutely confident, how confident are you in your ability to change?"*
- *"Why are you not at a lower/higher number?"*

Reference/s: [122] [126]

Obesity Medicine Association

5 A's of Obesity Management

Ask	• Ask for permission to discuss body weight. • Explore readiness for change.
Assess	• Assess BMI, waist circumference, and obesity stage. • Explore drivers and complications of excess weight.
Advise	• Advise the patient about the health risks of obesity, the benefits of modest weight loss (i.e., 5-10 percent), the need for long-term strategy, and treatment options.
Agree	• Agree on realistic weight-loss expectations, targets, behavioral changes, and specific details of the treatment plan.
Arrange/Assist	• Assist in identifying and addressing barriers; provide resources; assist in finding and consulting with appropriate providers; arrange regular follow up.

Reference/s: [113] [115] [116]

Obesity Medicine Association

Behavior Therapy

obesitymedicine.org

Obesity Medicine Association
CLINICAL LEADERS IN OBESITY MEDICINE

Eating Disorders and Obesity: Binge-eating Disorder

Diagnosis:

- Frequent episodes of consuming large amounts of food more than once per week for at least three months
  - No self-induced vomiting (purging)
  - No extra exercising
  - Feelings of lack of self control, shame, and guilt
- Occurs in 2-3 percent of U.S. adults
- Often considered the most common eating disorder
- May occur in up to 50 percent of patients with severe obesity
- Eating Attitudes Test may assist with diagnosis

Treatment:

- Cognitive behavior therapy
- **Lisdexamfetamine dimesylate** is the only pharmacotherapy with an FDA indication to treat binge-eating disorder
- Although not FDA indicated for this use, clinical trials suggest other pharmacotherapies may be efficacious
  - Some selective serotonin reuptake inhibitors
  - Topiramate

Reference/s: [143] [144] [145] [146] [147]

Obesity Medicine Association

Eating Disorders and Obesity: Night-eating Syndrome

Diagnosis:

- At least 25 percent of daily food consumption (often greater than 50 percent) consumed after evening meal
- Recurrent awakenings from sleep that require eating to go back to sleep, often involving carbohydrate-rich snacks
- Little interest in breakfast (morning anorexia)
- Night eating may occur in as much as 5 percent of the U.S. population

Treatment:

- Behavioral therapy regarding nutritional timing and content

Reference/s: [148] [149] [150]

Obesity Medicine Association

Anti-obesity Medications

obesitymedicine.org

Obesity Medicine Association
CLINICAL LEADERS IN OBESITY MEDICINE

Anti-obesity Medications

Adjunct to nutritional, physical activity, and behavioral therapies

Objectives:

- Treat disease
  - Adiposopathy or sick fat disease (SFD)
  - Fat mass disease (FMD)
- Facilitate management of eating behavior
- Slow progression of weight gain/regain
- Improve the health, quality of life, and body weight of the patient with overweight or obesity

5-10 percent weight loss may improve both metabolic and fat mass disease

Reference/s: [61] [165]

Food and Drug Administration (FDA) Principles

FDA-approved anti-obesity medication indications:

- Patients with obesity (e.g., BMI ≥ 30kg/m²)*
- Patients who are overweight (e.g., BMI ≥ 27kg/m²) with presence of increased adiposity complications (e.g., type 2 diabetes mellitus, hypertension, dyslipidemia)*

If no clinical improvement after 12 weeks with one anti-obesity medication, consider alternative anti-obesity medication or increasing anti-obesity medication dose (if applicable).

*While body mass index (BMI) is the only measure listed in the prescribing information for anti-obesity medications, BMI has limitations; Especially in muscular individuals or those with sarcopenia, overweight and obesity are more accurately assessed by other measures.

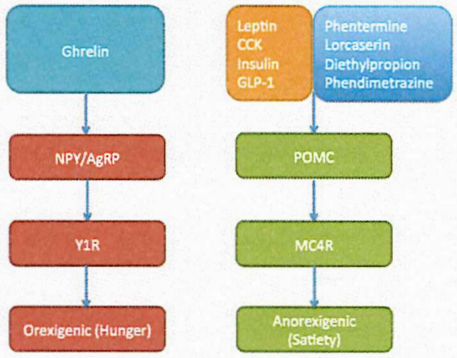
Pharmacotherapy

Examples of anti-obesity medications approved in 1999 or before

- Phentermine
- Diethylpropion
- Phendimetrazine
- Benzphetamine
- Orlistat

Examples of anti-obesity medications approved in 2012 and beyond

- Lorcaserin
- Phentermine HCL/topiramate extended release
- Naltrexone HCL/bupropion HCL extended release
- Liraglutide



Modified from, Gregory S. Barsh, Genetic approaches to studying energy balance: perception and integration, Nature Reviews Genetics 3

Sympathomimetic Amines

- Examples: **Phentermine, Diethylpropion, Phendimetrazine, Benzphetamine**
- **Increases satiety**
- Drug Enforcement Agency (DEA) Schedule weight-management agents
  - DEA IV for phentermine and diethylpropion
  - DEA III for phendimetrazine and benzphetamine
- Potential adverse experiences include:
  - Palpitation
  - Tachycardia
  - Increased blood pressure
  - Overstimulation
  - Tremor
  - Dizziness
  - Insomnia
  - Dysphoria
  - Headache
  - Dryness of mouth
  - Dysgeusia
  - Diarrhea
  - Constipation
  - **Pregnancy category X**

Reference/s: [8] [169] [170] [171]

Gastrointestinal Lipase Inhibitors

- Example: **Orlistat**
- **Impairs gastrointestinal energy absorption (fat)**
- Potential adverse experiences include:
  - Oily discharge from the rectum
  - Flatus with discharge
  - Increased defecation
  - Fecal incontinence
  - May increase risk of cholelithiasis
  - May increase risk of urinary oxalate
  - Rare post-marketing reports of severe liver injury
  - May decrease fast-soluble vitamin absorption (e.g., vitamins A, D, E, K, and beta carotene)
  - **Pregnancy category X**

Reference/s: [8] [167] [168]

Lorcaserin

Indications and Use

- **Serotonin (5-hydroxytryptamine) 2c receptor agonist**
- **Increased satiety**
- DEA IV drug
- Dose = 10 milligrams (mg) twice per day

Potential Adverse Experiences

- Headache
- Dizziness
- Fatigue
- Nausea
- Dry Mouth
- Constipation
- Cough
- Reduced Heart Rate
- Hyperprolactinemia

Reference/s: [172] [173] [503]

Lorcaserin

Cautions and Contra-indications

- If signs or symptoms of **valvular heart disease** develop, then discontinuation of lorcaserin should be considered during evaluation for valvulopathy
- Use with caution with use of hazardous machinery because of the potential for cognitive impairment with disturbances in attention or memory
- Use with caution among patients with psychiatric disorders, including euphoria and dissociation
- Use with caution among patients with psychiatric disorders and predisposed to depression who should be monitored for depression or suicidal thoughts; discontinue lorcaserin if symptoms develop
- Weight loss with lorcaserin may produce hypoglycemia in patients treated for diabetes mellitus
- Use with caution in men with history of priapism or predisposition to priapism
- **Contra-indicated during pregnancy or nursing mothers (pregnancy category X)**

Reference/s: [172] [173] [503]

Phentermine HCL/Topiramate Extended Release

Completion of Risk Evaluation and Mitigation Strategy (REMS) program to inform prescribers and female patients about the increased risk of congenital malformations (especially orofacial clefts) in infants exposed to phentermine HCL/topiramate extended release during the first trimester of pregnancy*

Indications and Use

- DEA IV drug
- Doses = Once daily in the morning with or without food
  - Starting dose = 3.75 mg/23 mg (phentermine/topiramate extended release)
  - After 14-day intervals, and as clinically indicated, escalate doses to:
    - Recommended dose = 7.5 mg/46 mg
    - Titration dose = 11.25 mg/69 mg
    - Top dose = 15 mg/92 mg

Reference/s: [174] [175] [504]

Phentermine HCL/Topiramate Extended Release

Potential Adverse Experiences

- In clinical trials, adverse reactions occurring more than or equal to 5 percent of the time include:
  - Paresthesia
  - Dizziness
  - Dysgeusia (taste distortion/perversion)
  - Insomnia
  - Constipation
  - Dry mouth

Laboratory abnormalities may include:

- Metabolic acidosis
- Elevated creatinine
- Lowering of glucose levels

Reference/s: [174] [175] [504]

Phentermine HCL/Topiramate Extended Release

Contra-indications

- Contra-indicated:
  - Glaucoma
  - Hyperthyroidism
  - During or within 14 days of taking monoamine oxidase inhibitors
  - Women of reproductive potential should have a negative pregnancy test before treatment and monthly thereafter and should use effective contraception while on phentermine HCL/topirimate extended release
  - **Pregnancy or nursing (Pregnancy category X)**
- Should be discontinued in patients with:
  - Unacceptable increases in adrenergic responses, such as increase in heart rate, especially in those with cardiac and/or cerebrovascular disease
  - Suicidal behavior and ideation
  - Acute myopia and secondary angle-closure glaucoma
  - Unacceptable mood and sleep disorders
  - Cognitive impairment
  - Pregnancy or nursing

Reference/s: [174] [175] [504]

Naltrexone HCL/Bupropion HCL Extended Release

Indications and Use

- Naltrexone is an opioid antagonist
- Bupropion is an aminoketone antidepressant
- Tablets = 8 mg/90 mg (naltrexone HCL/bupropion HCL extended release)
- Dosing:
  - Week 1 = 1 tablet in AM, no tablets in PM
  - Week 2 = 1 tablet in AM, 1 tablet in PM
  - Week 3 = 2 tablets in AM, 1 tablet in PM
  - Week 4 and beyond = 2 tablets in AM, 2 tablets in PM

Reference/s: [505]

Naltrexone HCL/Bupropion HCL Extended Release

Potential Adverse Experiences

- Nausea
- Constipation
- Headache
- Vomiting
- Dizziness
- Insomnia
- Dry mouth
- Diarrhea

Contra-indications

- Uncontrolled hypertension
- Seizure disorders, anorexia nervosa or bulimia, or undergoing abrupt discontinuation of alcohol, benzodiazepines, barbiturates, and antiepileptic drugs
- Use of other products containing bupropion
- Chronic opioid use
- During or within 14 days of taking monoamine oxidase inhibitors
- Known allergy to any of its ingredients
- **Contra-indicated during pregnancy or nursing mothers (pregnancy category X)**

Reference/s: [505]

Liraglutide

Indications and Use

- Liraglutide is a glucagon-like peptide-1 (GLP-1) receptor agonist
- Solution for subcutaneous injection, pre-filled, multi-dose pen that delivers doses of 0.6 mg, 1.2 mg, 1.8 mg, 2.4 mg, or 3 mg
- Inject subcutaneously in the abdomen, thigh, or upper arm; the injection site and timing can be changed without dose adjustment
- Recommended dose of liraglutide for treatment of obesity is 3 mg daily, any time of day, without regard to the timing of meals
- Dosing:
  - Week 1 = 0.6 mg per day
  - Week 2 = 1.2 mg per day
  - Week 3 = 1.8 mg per day
  - Week 4 and beyond = 3.0 mg per day

*Completion of the FDA mandated REMS program is optional and not required prior to prescribing liraglutide. Implementation of the REMS program by clinicians and pharmacies is intended to provide appropriate safety information pertaining to the potential serious risks of taking liraglutide, which include **medullary thyroid carcinoma (MTC) and acute pancreatitis.**

Reference/s: [506]

Liraglutide

Potential Adverse Experiences

- Nausea
- Hypoglycemia
- Diarrhea
- Constipation
- Vomiting
- Headache
- Decreased appetite
- Dyspepsia
- Fatigue
- Dizziness
- Abdominal pain
- Increased lipase

Contra-indications

- Personal or family history of medullary thyroid carcinoma or Multiple Endocrine Neoplasia syndrome type 2
- Hypersensitivity to liraglutide or any product components
- Contra-indicated during pregnancy or nursing mothers **(pregnancy category X)**

Reference/s: [506]

Bariatric Surgery

obesitymedicine.org

Potential Bariatric Surgery Candidate

What is the patient's BMI (in kg/m^2)?
Does clinical evidence exist confirming the presence of adverse health consequences (AHC) due to excessive and/or dysfunctional body fat?

- BMI ≥ 35 with one or more AHC
- BMI ≥ 40 with or without AHC

*BMI 30-34.9 with one or more AHC: Mounting evidence supports surgical intervention as a treatment option in this group

Reference/s:[181] [182] [183] [184] [185] [189] [190] [191] [192] [193] [194] [509]

Bariatric Surgery Pre-operative Evaluation

- Medical evaluation by physician specializing in the care of patients with overweight or obesity
- Surgical consultation by bariatric surgery specialist
- Cardiology, pulmonary, gastroenterology, and/or other specialty consultation as indicated
- Mental health assessment: underlying eating disorders; mood disorders; substance abuse; history of physical or emotional trauma; education regarding potential for increased suicide risk and transfer addictions post op; evaluation of existing coping mechanisms
- Nutritional assessment (e.g., dietitian)
- Educational support (e.g., pre-operative seminar)

Reference/s: [183] [509]

Roux-en-Y Gastric Bypass (RNY)

A surgical procedure wherein the stomach is completely divided into a small proximal gastric pouch leaving a large "bypassed" gastric remnant in situ. The proximal gastric pouch is attached to a "roux" limb of small bowel, bypassing the large gastric remnant, all of the duodenum, and a portion of the proximal small intestine.

General

- Hospital stay = 1-4 days
- Recovery = 1-2 weeks
- Contra-indications:
  - Poor surgical candidate
  - Severe psychiatric disorder
  - Intolerance to general anesthesia
  - Pregnancy
  - Drug or alcohol addiction
  - Untreated gastric ulcer
  - Crohn's disease
- Patient demonstrates an unwillingness or an inability to follow long term recommendations which can lead to life threatening micronutrient deficiencies

Most Common Acute Complications

- Nausea/Vomiting
- Dehydration
- Gastrointestinal obstruction
- Gastrointestinal bleeding
- Acute gout exacerbation
- Anastomotic leaks
- Infection
- Cardiac dysrhythmias
- Atelectasis and pneumonia
- Deep vein thrombosis
- Pulmonary emboli
- Death

Reference/s: [183] [184] [197] [198] [199]

Roux-en-Y Gastric Bypass (RNY)

Common Chronic Complications

- Weight regain
- Pouch/Anastomotic dilation
- Anastomotic/Marginal ulcers
- Esophageal dilation
- Dumping syndrome with reactive hypoglycemia
- Small bowel obstruction caused by internal hernias or adhesions
- Anastomotic stenosis/stricture
- Gallstones
- Calcium deficiency
- Secondary hyperparathyroidism
- Bacterial overgrowth
- Kidney stones (oxalosis)
- Metabolic acidosis
- Iron deficiency
- Protein malnutrition
- Other nutritional and mineral deficiencies (i.e., deficiencies of vitamins A, C, D, E, B, and K, folate, zinc, magnesium, thiamine)
- Anemia (often related to mineral and nutrition deficiencies)
- Neuropathies (resulting from nutritional deficiencies)
- Gout exacerbation
- Osteoporosis (often caused by calcium deficiency and chronically elevated parathyroid hormone levels)
- Depression
- Potential need for revision or conversion to another procedure

Reference/s: [183] [184] [197] [198] [199] [204]

Vertical Sleeve Gastrectomy (VSG)

A surgical procedure wherein the stomach is reduced to about 25 percent of its original size by the surgical removal of a large portion of the stomach along the greater curvature, resulting in a narrower sleeve or tube-like structure.

General

- Hospital stay = 1-2 days
- Recovery = 1-2 weeks
- Contra-indications:
  - Poor surgical candidate
  - Severe psychiatric disorder
  - Intolerance to general anesthesia
  - Pregnancy
  - Drug or alcohol addiction
  - Untreated gastric ulcer
  - Barrett's esophagus
  - Achalasia
  - Previous gastrectomy
  - Previous gastric bypass
- Sometimes used as a staged approach to gastric bypass or doudenal switch

Most Common Acute Complications

- Nausea/Vomiting
- Dehydration
- Gastrointestinal obstruction
- Gastrointestinal bleeding
- Staple line leaks
- Infection
- GERD
- Cardiac dysrhythmias
- Atelectasis and pneumonia
- Deep vein thrombosis
- Pulmonary emboli
- Death

Reference/s: [5] [183] [184] [185] [196] [197] [200] [201]

Obesity Medicine Association

Vertical Sleeve Gastrectomy (VSG)

Most Common Chronic Complications

- Weight regain or lack of long-term weight loss
- Sleeve dilation
- Gastric ulcers
- Worsening GERD or de novo GERD
- Luminal stenosis/strictures
- Alkaline reflux gastritis
- Staple line leaks
- Fistula formation
- Gallstones
- Calcium deficiency
- Secondary hyperparathyroidism
- Iron deficiency
- Anemia (related to mineral and nutrition deficiencies)
- B12 & B1 deficiency(IF)
- Protein malnutrition uncommon
- Vitamin deficiencies uncommon
- Kidney stones (oxalosis)
- Depression
- Potential need for revision or conversion to another procedure

Reference/s: [5] [183] [184] [185] [196] [197] [200] [201] [204]

Obesity Medicine Association

Laparoscopic Adjustable Gastric Banding (LAGB)

A surgical procedure where an adjustable band is placed around the upper stomach creating a small pouch. The band diameter is adjustable through the percutaneous introduction of saline via a subcutaneous port which is accessed in the upper abdomen.

**Performance of LAGB has declined due to limited long-term efficacy and international removal rate of at least 25 percent at five years.*

General

- Outpatient procedure
- Recovery usually one week
- Food bolus obstruction (dry meat; starches)
- Contra-indications:
  - Poor surgical candidate
  - Severe psychiatric disorder
  - Intolerance to general anesthesia
  - Pregnancy
  - Drug or alcohol addiction
  - Untreated gastric ulcer, severe GERD, Barrett's disease
  - Autoimmune disease

Reference/s: [5] [183] [184] [195] [197] [198] [203]

Obesity Medicine Association

Laparoscopic Adjustable Gastric Banding (LAGB)

Most Common Acute Complications

- Nausea/vomiting
- Dehydration
- Band too tight with gastrointestinal obstructive symptoms (i.e., dysphagia)
- Hemorrhage
- Gastrointestinal bleeding
- Infection
- Cardiac dysrhythmias
- Atelectasis and pneumonia
- Deep vein thrombosis

Most Common Chronic Complications

- No weight loss or weight regain
- Band slippage, erosion, ulceration, port infection, disconnection, and displacement
- Esophageal dilation
- Rare nutrient deficiencies if persistent vomiting or marked and sustained decrease in nutritional intake
- Depression
- Potential need for removal, revision or conversion to another procedure

Reference/s: [5] [183] [184] [195] [197] [198] [203]

Obesity Medicine Association

Biliopancreatic Diversion with Duodenal Switch (BPD/DS)

Procedure in which a partial gastrectomy (much like a sleeve) is performed, removing 70-80% greater curvature of the stomach sparing the pylorus and a small portion of the duodenum and the creation of a Roux-en-Y duodenenterostomy bypassing a large portion of the intestine.

General

- Hospital stay = 2-4 days
- Recovery = 2-4 weeks
- Contra-indications:
  - Poor surgical candidate
  - Severe psychiatric disorder
  - Intolerance to general anesthesia
  - Pregnancy
  - Drug or alcohol addiction
  - Untreated gastric ulcer
  - Crohn's disease
- Patient demonstrates an unwillingness or an inability to follow long term recommendations which can lead to life threatening micronutrient deficiencies

Most Common Acute Complications

- Nausea/Vomiting
- Dehydration
- Gastrointestinal obstruction
- Gastrointestinal bleeding
- Acute gout exacerbation
- Anastomotic leaks
- Infection
- Cardiac dysrhythmias
- Atelectasis and pneumonia
- Deep vein thrombosis
- Pulmonary emboli
- Death

References: [183] [194] [197] [202]

Biliopancreatic Diversion with Duodenal Switch (BPD/DS)

Most Common Chronic Complications

- Weight regain
- Pouch dilation
- Anastomotic/Marginal ulcers
- Small bowel obstruction caused by internal hernias or adhesions
- Anastomotic stenosis/stricture
- Gallstones
- Calcium deficiency
- Secondary hyperparathyroidism
- Bacterial overgrowth
- Kidney stones (oxalosis)
- Metabolic acidosis
- Iron deficiency
- Protein malnutrition*
- Other nutritional and mineral deficiencies (i.e., deficiencies of vitamins A, C, D, E, B, and K, folate, zinc, magnesium, thiamine)*
- Anemia (often related to mineral and nutrition deficiencies)
- Neuropathies* (resulting from nutritional deficiencies)
- Gout exacerbation
- Osteoporosis (often caused by calcium deficiency and chronically elevated parathyroid hormone levels)
- Depression
- Potential need for revision

*The BPD/DS has a much higher incidence of both macro- and micronutrient deficiencies compared to other bariatric surgeries.

References: [183] [194] [197] [202]

Bariatric Surgical Procedures

	Pros	Cons	Expected loss in percent excess body weight* at two years	Optimally suited for patients with:	Other comments
Roux-en-Y Gastric Bypass	Greater improvement in metabolic disease	Increased risk of malabsorptive complications over sleeve	60-75%	Higher BMI, GERD, Type 2 DM	Largest data set, more technically challenging than LAGB, VSG
Vertical Sleeve Gastrectomy	Improves metabolic disease; maintains small intestinal anatomy; micronutrient deficiencies infrequent	No long term data	50-70% (*3-year data)	Metabolic disease	Can be used as the first step of staged approach; most common based on 2014 data
Laparoscopic Adjustable Gastric Banding	Least invasive; removable	25-40% 5 year removal rate internationally	30-50%	Lower BMI; no metabolic disease	Any metabolic benefits achieved are *dependent* on weight loss
Biliopancreatic Diversion *with* Duodenal Switch	Greatest amount of weight loss and resolution of metabolic disease	Increased risk macro- and micronutrient deficiencies over bypass	70-80%	Higher BMI, Type 2 DM	Most technically challenging

*Excess body weight (EBW) = (total body weight) - (lean body weight)

References: [183] [195] [197] [198] [199] [204] [509]

Relatively Common Micronutrient Deficiencies

	Vitamins							Minerals		
	A	B1	B9	B12	D*	E	K	Ca	Fe	Zn/Cu
RNY		X	X	X	X			X	X	
Sleeve		X	X	X	X				X	
LAGB		X			X					
BPD	X	X	X	X	X	X	X	X	X	X

*Vitamin D deficiency is seen in a significant number of patients with obesity at baseline. However, due to malabsorption, the risk is further increased post-op.

For a complete explanation of micronutrient deficiencies, refer to "Clinical Practice Guidelines for the Perioperative Nutritional, Metabolic, and Nonsurgical Support of the Bariatric Surgery Patient" at www.asmbs.org.

References: [183] [186] [187] [199] [204] [509]

Evaluation and Treatment Summary

Comprehensive Evaluation of the Patient with Overweight/Obesity

History	Weight history, past medical history, family history, social history, screening for weight-promoting medications, food intake, activity, review of systems
Physical Examination	Height, weight, blood pressure, body composition analysis, waist measurement, complete physical examination
Laboratory Tests*	Complete blood count, electrolytes, liver function, kidney function, fasting lipid profile, thyroid tests, hemoglobin A1c, uric acid, vitamin D
Diagnostic Testing*	EKG, echocardiogram, exercise stress test, sleep study, barium swallow or esophagoduodenoscopy

*lab and diagnostic testing should be individualized

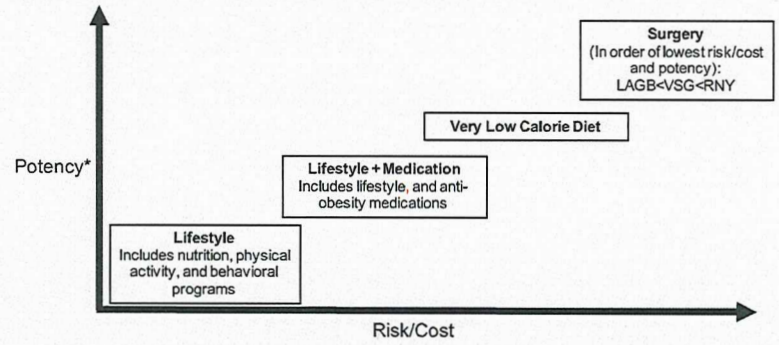
Individualized Treatment Plans*

Diet	Use calorie restriction, carbohydrate restriction, food journaling, very low-calorie diet programs
Activity	Give exercise prescription, use pedometers, limit TV and computer time, decrease sedentary time, initial goal of 150 minutes per week of moderate-intensity physical activity
Counseling	Eliminate provider bias and stigma, identify self-sabotage, develop strong support, address stress management, sleep optimization, other psychological support as needed
Pharmacotherapy	Use pharmacotherapy as part of a comprehensive program
Referral	Consider referral to an obesity medicine specialist

*If ineffective, consider referral to a metabolic and bariatric surgeon. Optimal pre- and post-operative care includes an obesity medicine specialist.

Obesity Medicine Association

Current Treatment Options for Obesity



*Potency includes many factors, such as the amount, rate, and sustainability of weight loss, and the long-term resolution of adiposopathy and fat mass disease. Potency varies greatly for each individual (i.e., long-term adherence to a lifestyle program can be as potent as gastric bypass surgery).

Obesity Medicine Association