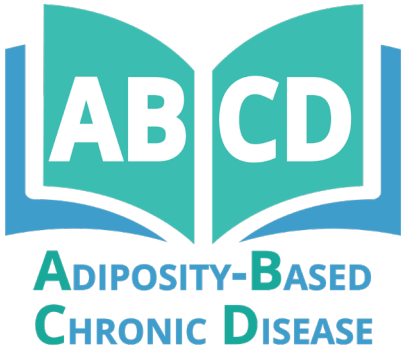
Individualizing Weight Loss Therapy

Agenda



- Overview of obesity as an "**A**diposity-**B**ased **C**hronic **D**isease" also known as ABCD[1]
- 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

1 Mechanick, Jeffrey I., et al. Endocrine Practice. Mar 2017, Vol 23, No. 3 (March 2017) p.372-378

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 → stored as fat in enlarged or more numerous adipocytes & ectopically

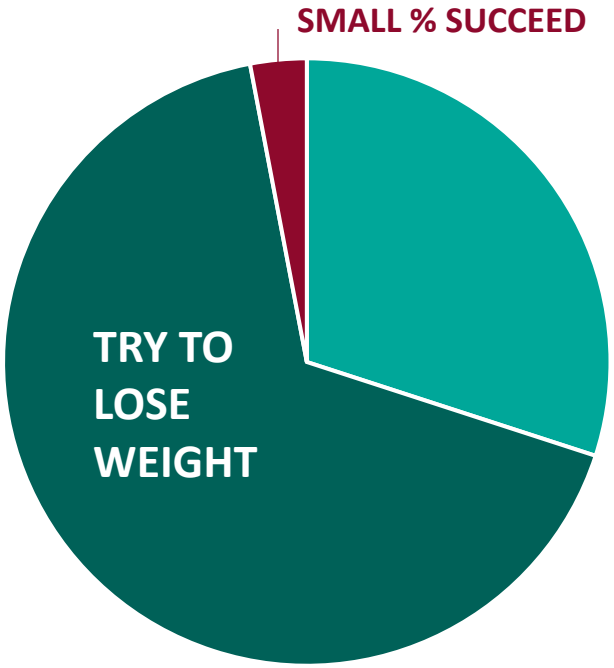
Obes Rev. 2017;18(7):715-723
Endocr Pract 2012;19(5):643-648

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

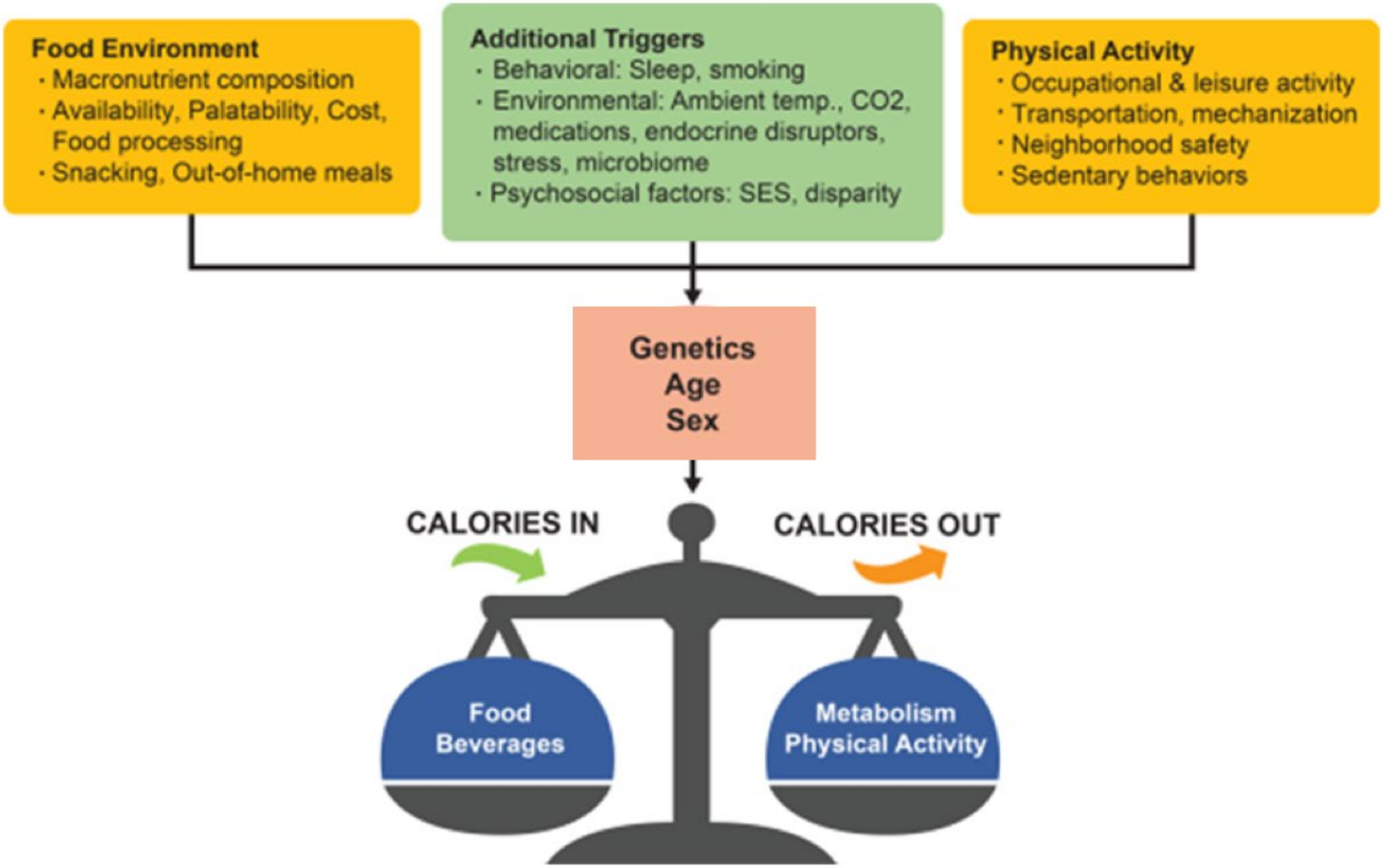
Bray, G.A., et al. Endocrine Practice 2012; 19(5):643-648

Weight Loss: Overview



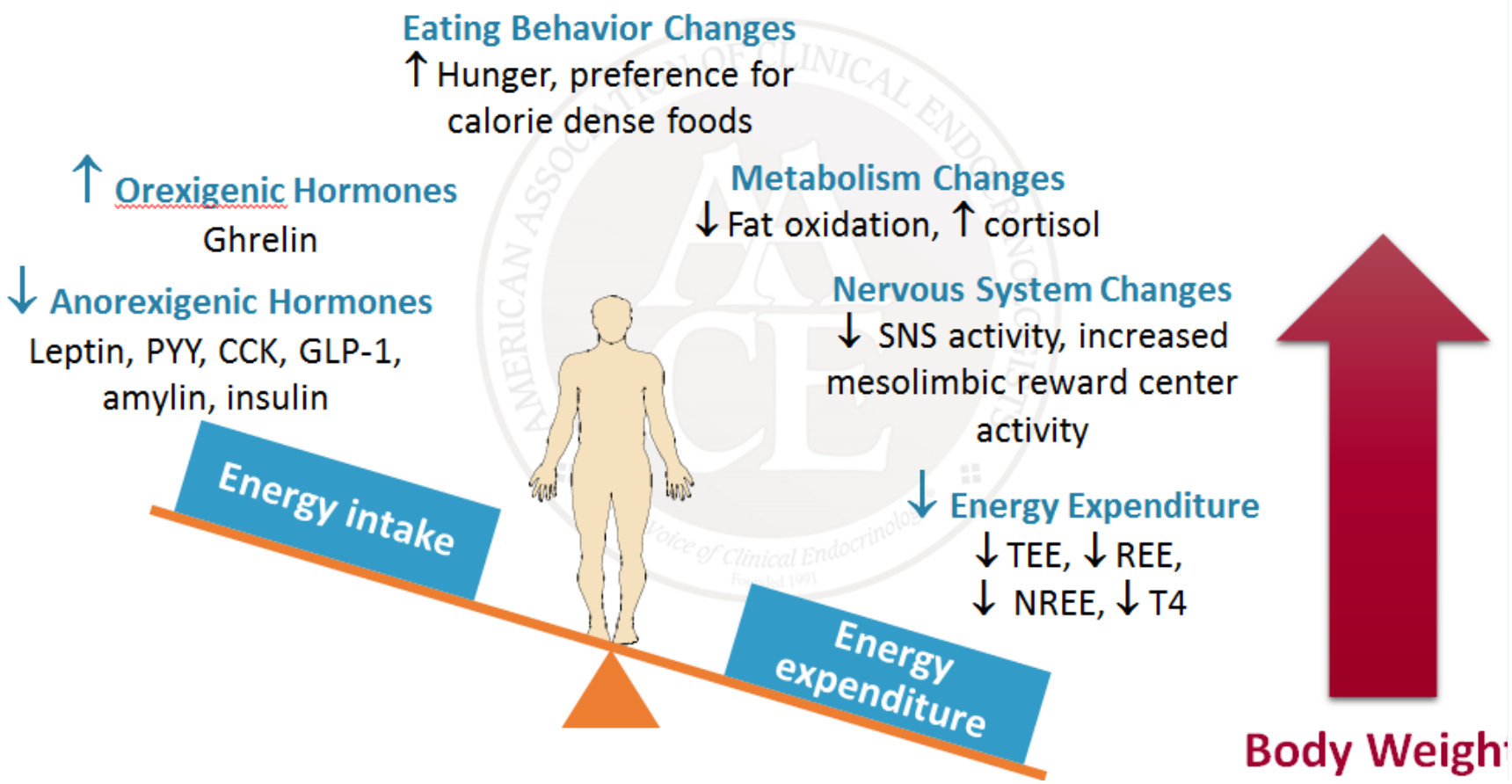
- Between 60% to 70% Americans try to lose weight each year.
- Only a small percentage can achieve their goal and maintain weight loss.
- There is no “one size fits all” perfect diet/weight-loss program.
- Optimal program is the one to which patients adheres.
- Obesity is complicated and heterogeneous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

Components Effecting Energy Balance



Obesity (Silver Spring). 2018;26(1):9-10

Adaptations to Weight Loss: Obesity Protects Obesity

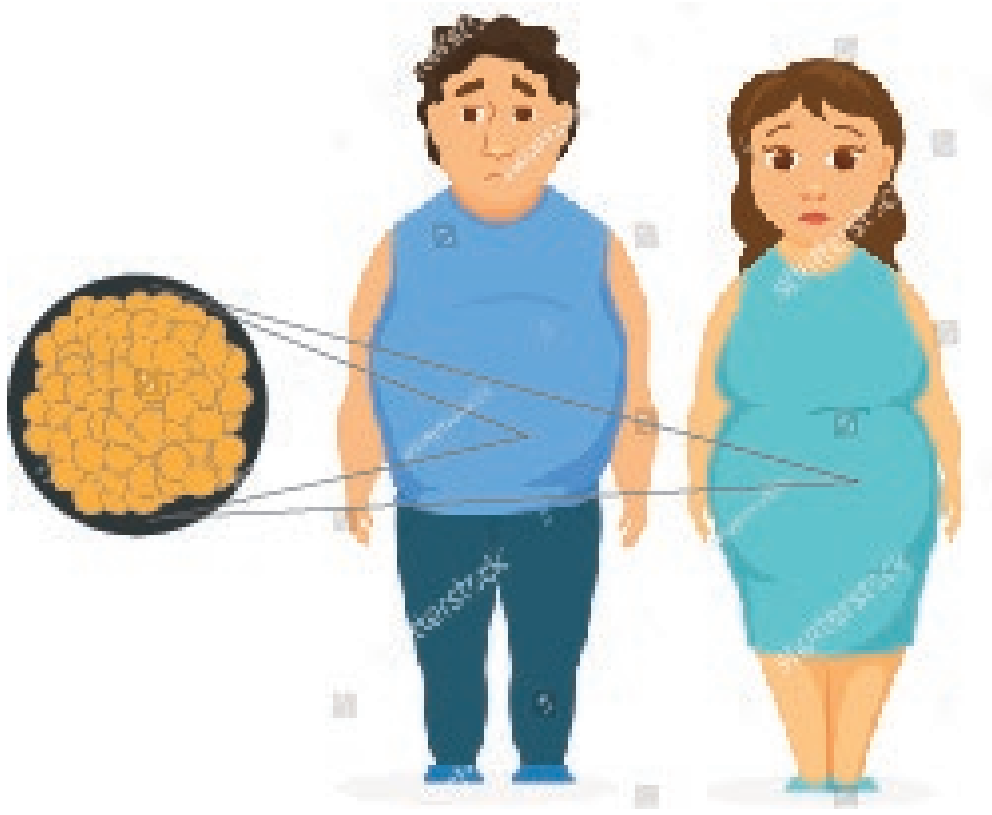


CCK = cholecystokinin ; GLP-1 = glucacon like peptide 1; NREE = nonresting energy expenditure; PYY = peptide YY; SNS = sympathetic nervous system; REE = resting energy expenditure; T4 = thyroxine; TEE = total energy expenditure.

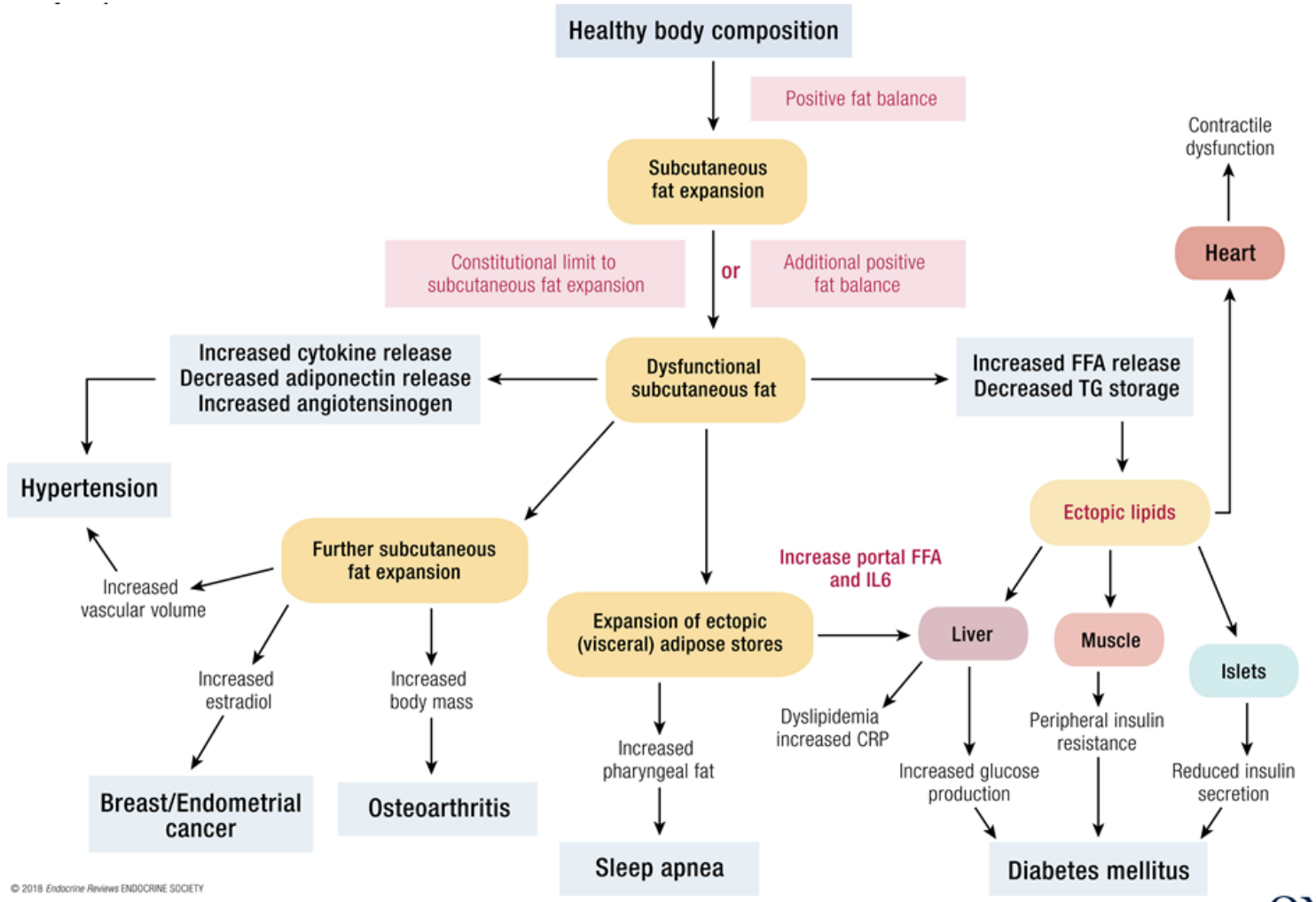
Sumithran P, Proietto J. *Clin Sci (Lond)*. 2013;124:231-241.

Obesity: **A**diposity-**B**ased **C**hronic **D**isease

- Mechanical complications (excess adiposity in general)
- Cardiometabolic Complications (hypertension, dyslipedaemia,
- hyperglycaemia, dyslipidemia and hyperglycemia)
- Psychological changes

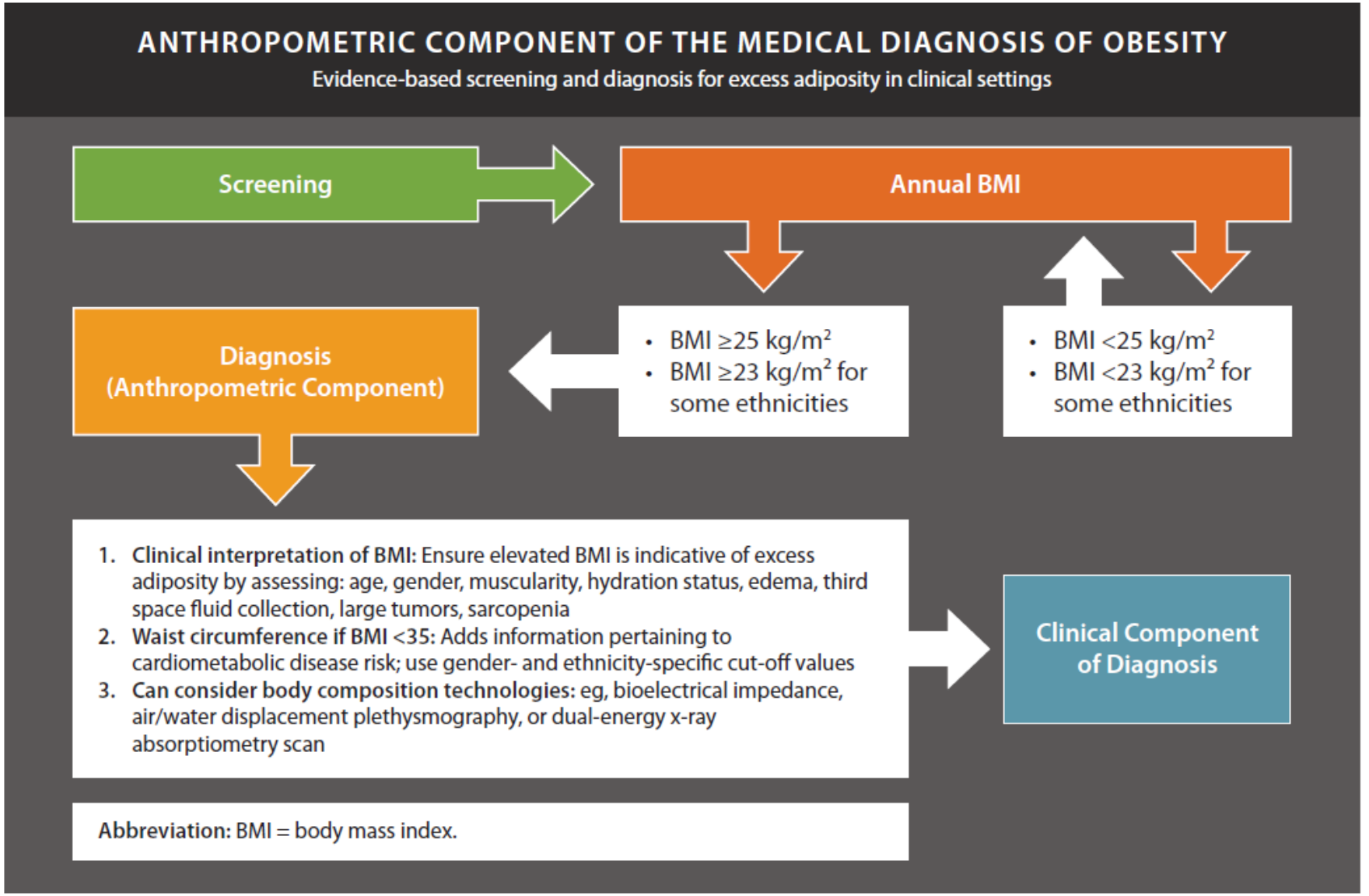


A Schematic Model of the Intermediary Mechanisms for Dyslipidemia, insulin resistance, T2DM, Heart Disease

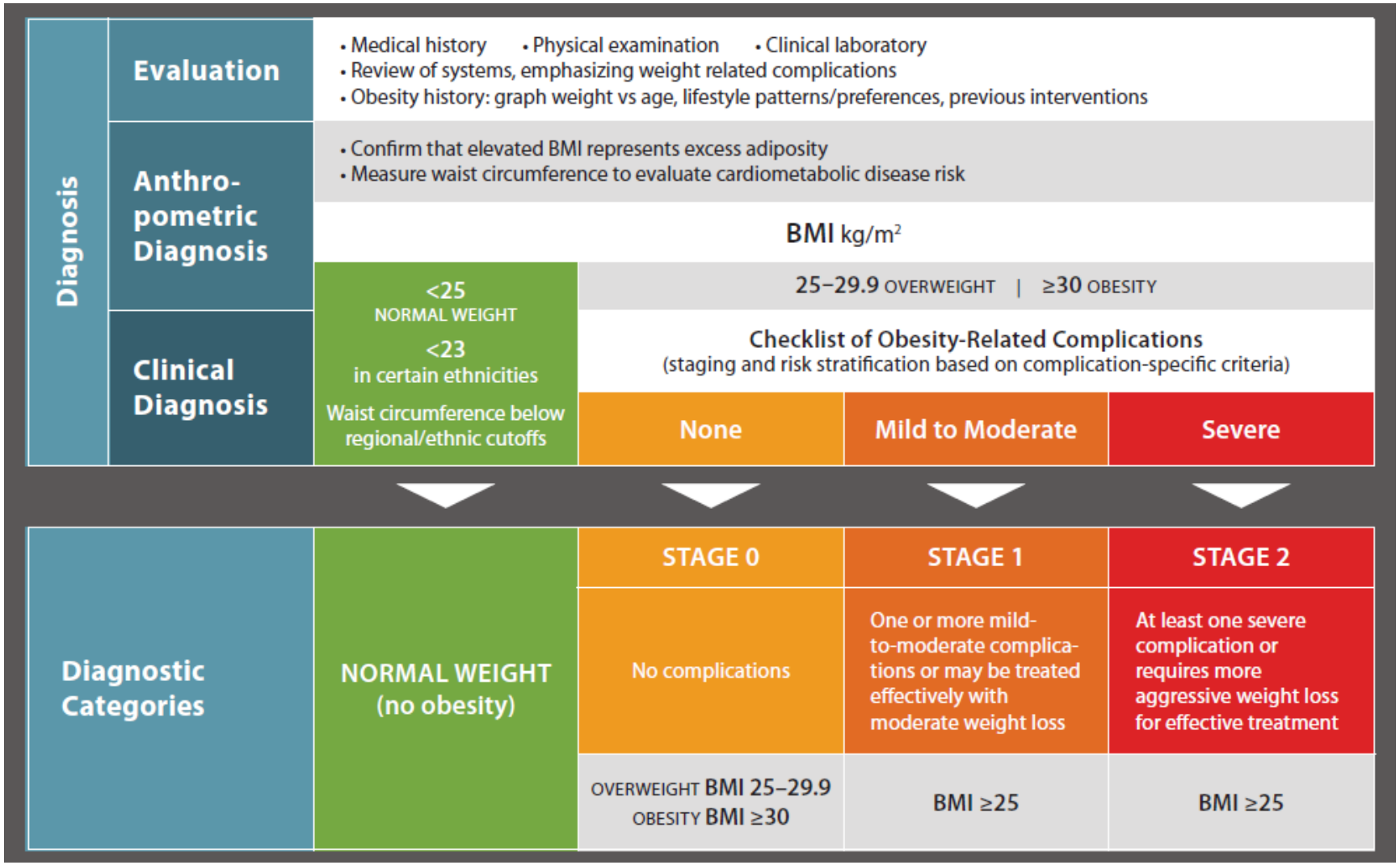


Endocrine Reviews, Volume 39, Issue 2, April 2018, Pages 79–132, https://doi.org/10.1210/er.2017-00253

Obesity as a clinical diagnosis

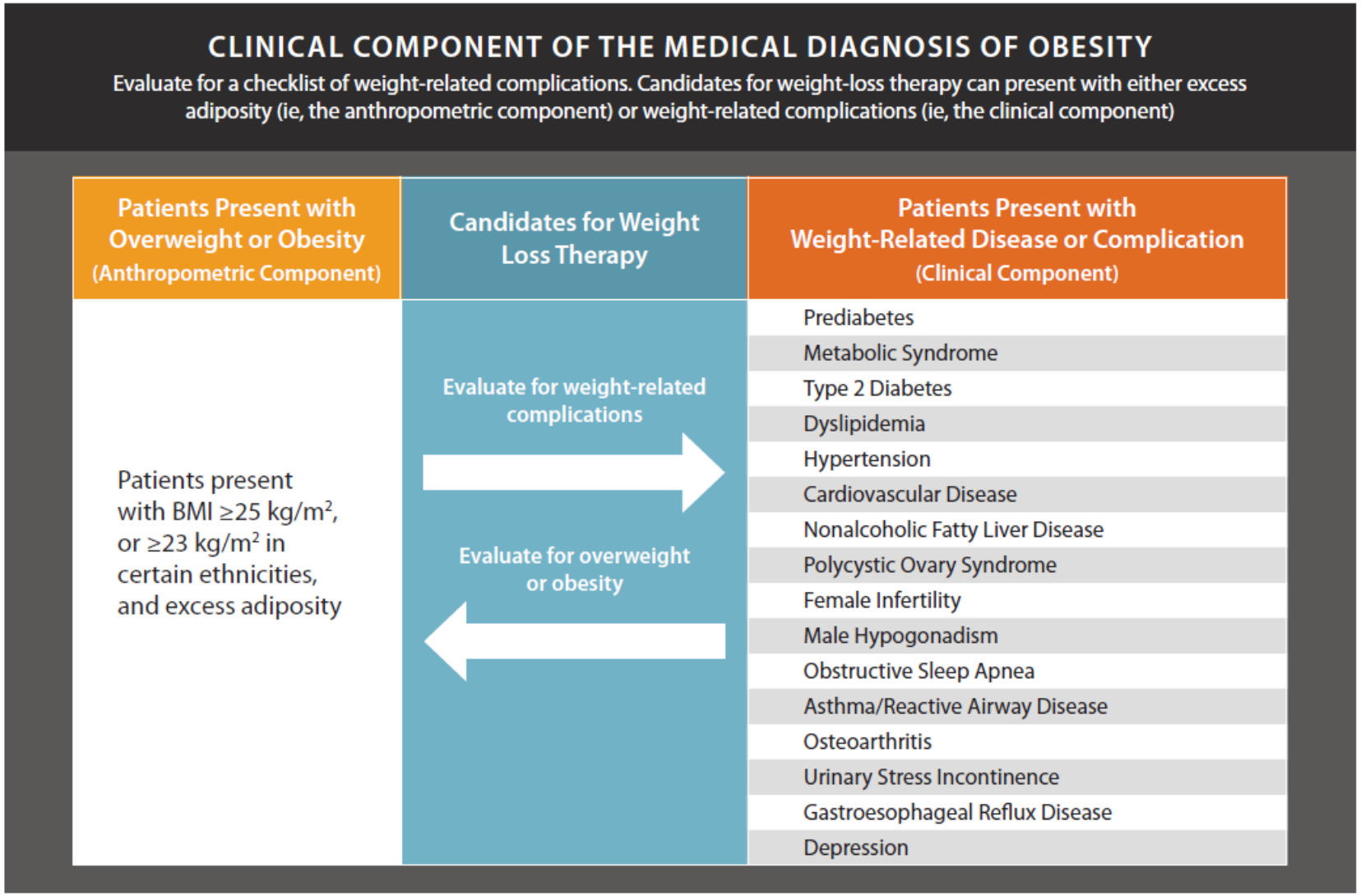


Obesity is a clinical diagnosis



https://rdcu.be/bY7FU accessed December 16 2019

Obesity is a clinical diagnosis

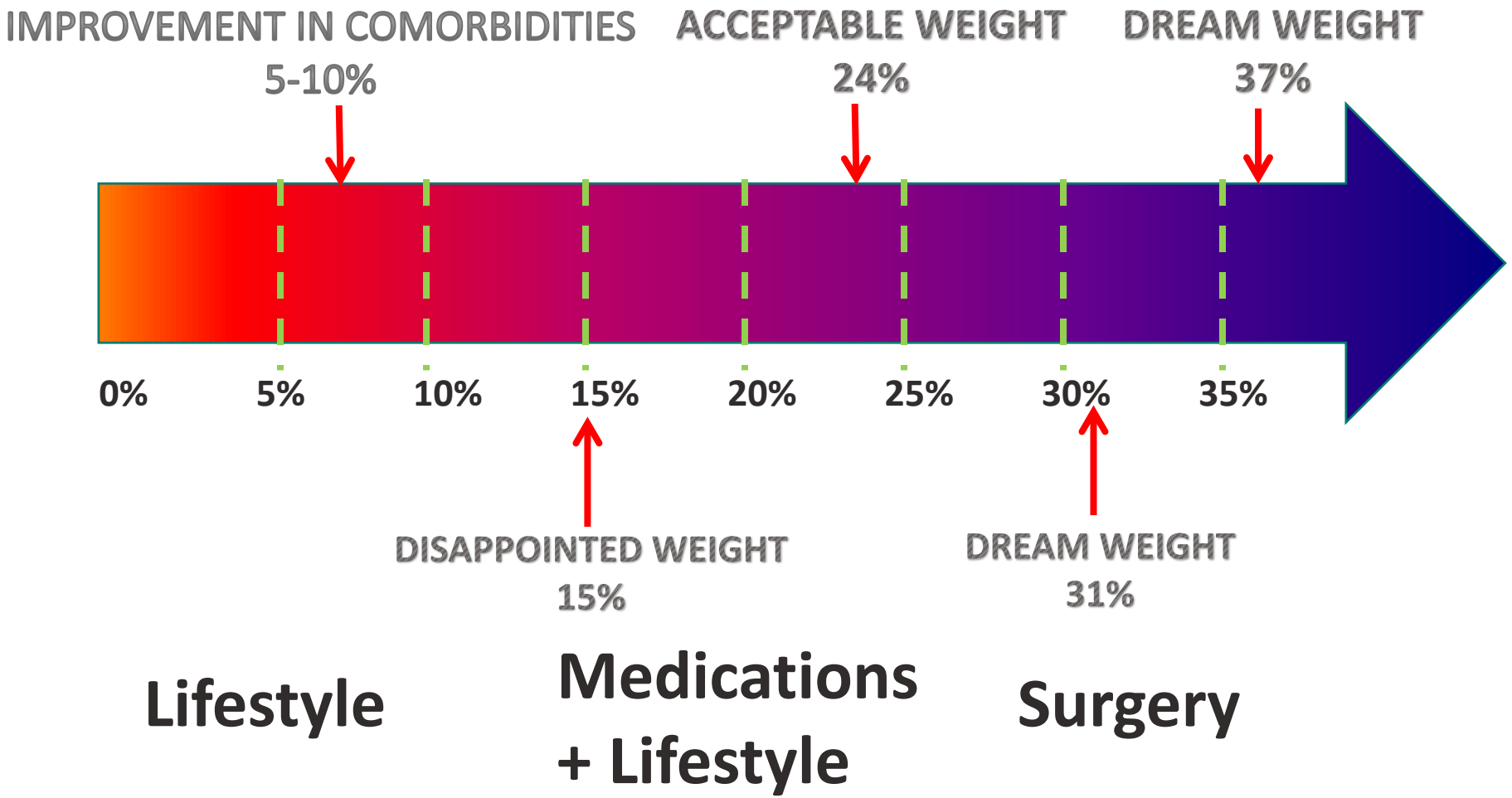


Management of obesity

- 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



Foster and Wadden et al. J Consult Clin Psychol. 1997 Feb65(1). 79-85.

Treatment Goals

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

	DIAGNOSIS		TREATMENT GOALS	
	Anthropometric Component	Clinical Component	Intervention/ Weight-Loss Goal	Clinical Goals
PRIMARY PREVENTION				
Primordial Prevention	BMI ≤25 (≤23 in certain ethnicities)	Obesogenic environment	• Public education • Built environment • Access to healthy foods	Decreased incidence of overweight/obesity in populations
Primary Prevention	BMI ≤25 (≤23 in certain ethnicities)	High-risk individuals or subgroups based on individual or cultural behaviors, ethnicity, family history, biomarkers, or genetics	• Annual BMI screening • Healthy meal plan • Increased physical activity	Decreased incidence of overweight/obesity in high-risk individuals or identifiable subgroups
SECONDARY PREVENTION				
Overweight	BMI 25–29.9 (BMI 23–24.9 in certain ethnicities)	No clinically significant or detectable weight-related complications	• Prevent progressive weight gain or • Weight loss	• Prevent progression to obesity • Prevent the development of weight-related complications
Obesity	BMI ≥30 (≥25 in certain ethnicities)	No clinically significant or detectable weight-related complications	• Weight loss or • Prevent progressive weight gain	Prevent the development of weight-related complications
TERTIARY PREVENTION Recommendations 30-63				
Overweight or Obesity	BMI ≥25 (≥23 in certain ethnicities)	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

Garvey, et al. Endocr Pract. 2016 Jul;22(7):842-84

Prevention

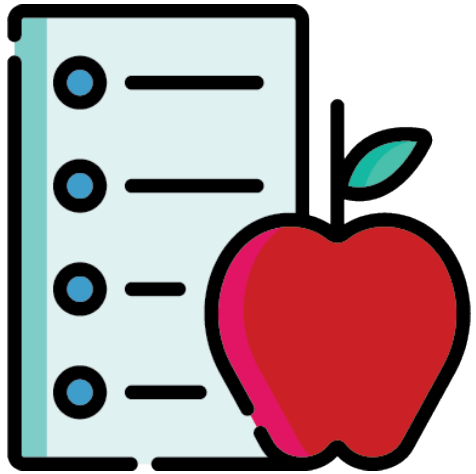
TERTIARY PREVENTION				
Overweight or Obesity	BMI ≥25 (≥23 in certain ethnicities)	Hypertension	5% to ≥15%	• Lower systolic and diastolic BP • Reductions in number and/or doses of antihypertensive medications
		Nonalcoholic fatty liver disease – Steatosis	5% or more	Reduction in intrahepatocellular lipid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

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

Garvey, et al. Endocr Pract. 2016 Jul;22(7):842-84

Structured Obesity Management

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



Lifestyle Therapy

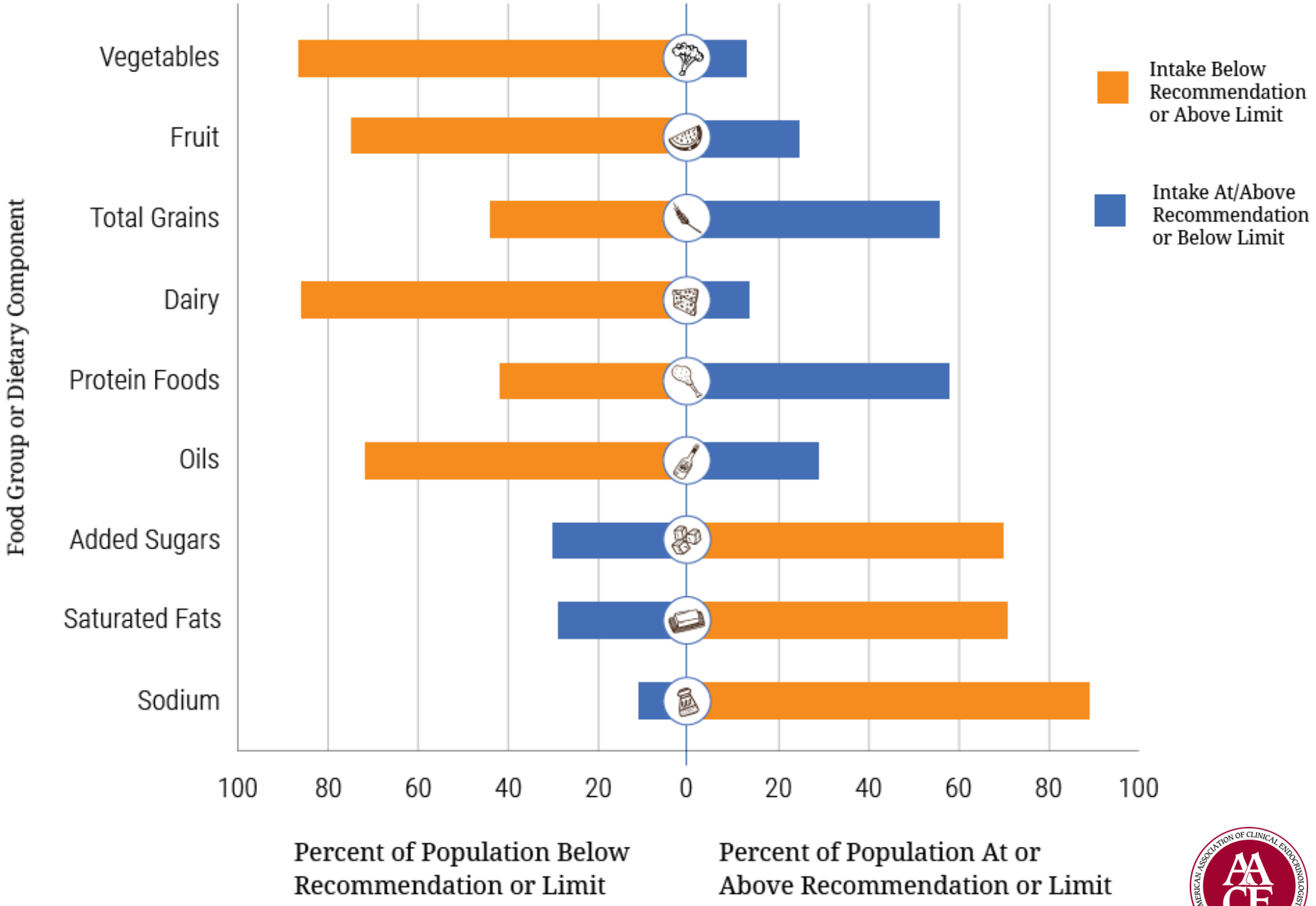
LIFESTYLE THERAPY Evidence-based lifestyle therapy for treatment of obesity should include three components		
MEAL PLAN	**PHYSICAL ACTIVITY**	**BEHAVIOR**
• Reduced-calorie healthy meal plan • ~500–750 kcal daily deficit • Individualize based on personal and cultural preferences • Meal plans can include: Mediterranean, DASH, low-carb, low-fat, volumetric, high protein, vegetarian • Meal replacements • Very low-calorie diet is an option in selected patients and requires medical supervision Team member or expertise: dietitian, health educator	• Voluntary aerobic physical activity progressing to >150 minutes/week performed on 3–5 separate days per week • Resistance exercise: single-set repetitions involving major muscle groups, 2–3 times per week • Reduce sedentary behavior • Individualize program based on preferences and take into account physical limitations Team member or expertise: exercise trainer, physical activity coach, physical/occupational therapist	An interventional package that includes any number of the following: • Self-monitoring (food intake, exercise, weight) • Goal setting • Education (face-to-face meetings, group sessions, remote technologies) • Problem-solving strategies • Stimulus control • Behavioral contracting • Stress reduction • Psychological evaluation, counseling, and treatment when needed • Cognitive restructuring • Motivational interviewing • Mobilization of social support structures Team member or expertise: health educator, behaviorist, clinical psychologist, psychiatrist

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.

Dietary Intakes Compared to Recommendations. Percent of the U.S. Population Ages 1 Year and Older Who Are Below, At, or Above Each Dietary Goal or Limit



https://health.gov/dietaryguidelines/2015/guidelines/chapter-2/current-eating-patterns-in-the-united-states/

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

Most balanced plans	Dietary Approaches to Stop Hypertension (DASH) Mediterranean diet
Low carbohydrate plans	Ketogenic Atkins South Beach
High protein plans	Dukan Paleo
Very low-fat plans	Ornish Pritikin Weight Watchers
Vegan vs Plant-based	
Optifast: very-low-calorie diet (VLCD) for limited duration only	
Intermittent fasting plans	

Table from "Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report."

Type of eating pattern	Description	Potential benefits reported*
USDA Dietary Guidelines For Americans (DGA) (8)	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.	DGA added to the table for reference; not reviewed as part of this Consensus Report
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

Diabetes Care. 2019. May;42(5):731-754

Table from "Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report."

Very low-fat (107–109)	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.	• Weight loss • Lowered blood pressure
Low-carbohydrate (110–112)	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.	• A1C reduction • Weight loss • Lowered blood pressure • Increased HDL-C and lowered triglycerides
Very low-carbohydrate (VLC) (110–112)	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 <26% of total calories.	• A1C reduction • Weight loss • Lowered blood pressure • Increased HDL-C and lowered triglycerides
Dietary Approaches to Stop Hypertension (DASH) (81,118,119)	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.	• Reduced risk of diabetes • Weight loss • Lowered blood pressure
Paleo (120–122)	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.	• Mixed results • Inconclusive evidence

Diabetes Care. 2019 May;42(5):731-754

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

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

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

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

Keto Diet: Benefits, Disadvantages

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

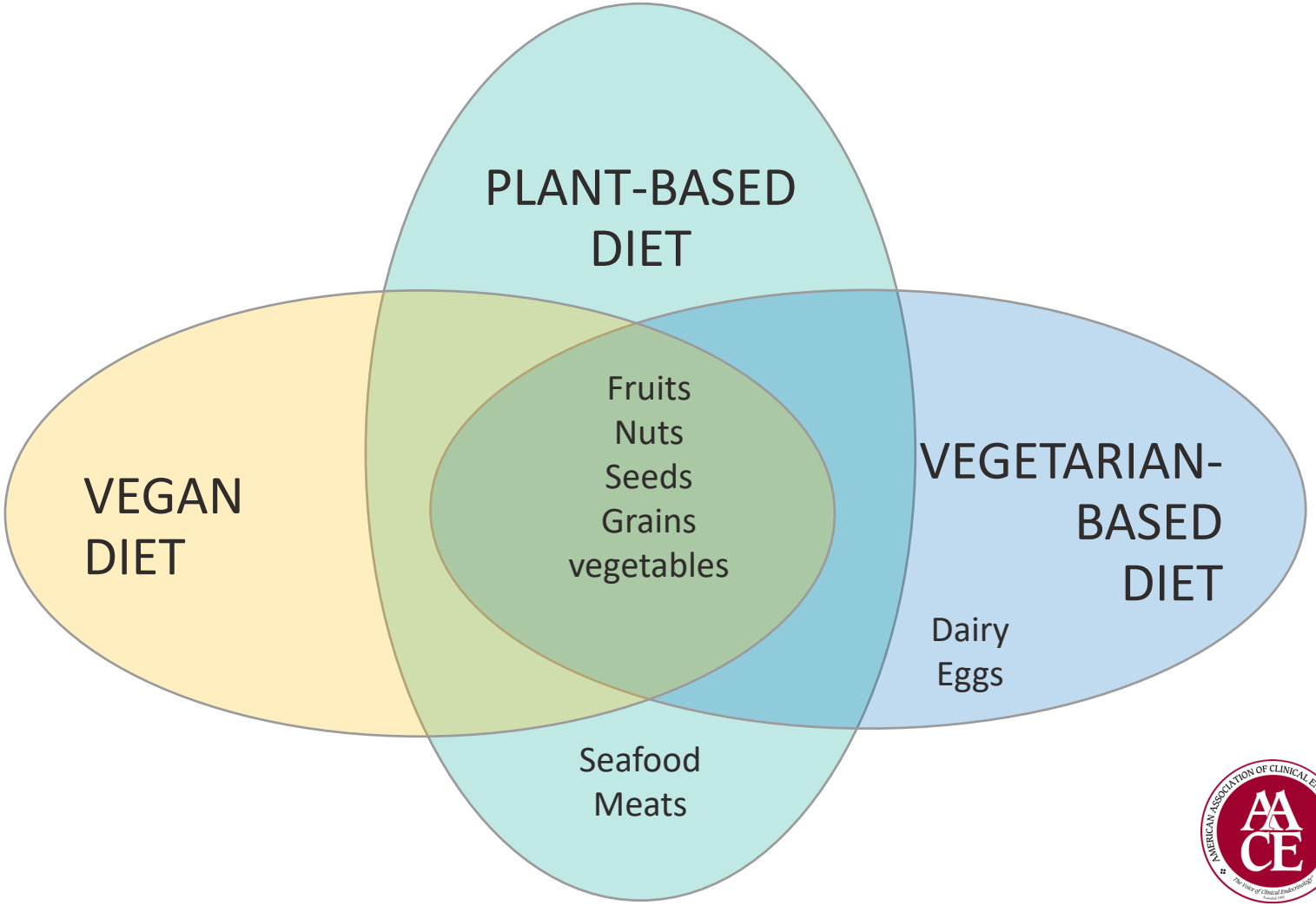
Paleo Diet: benefits, Disadvantages

- 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)

FOODS TO EAT	FOODS NOT TO EAT
Vegetables, fruits, nuts, seeds, lean meat, fish, eggs,	Grains, legumes, potatoes, dairy,
Herbs/spices, oils from fruits/nuts	All processed food, trans unsaturated fatty acids (transfats), refined sugars

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 that 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.

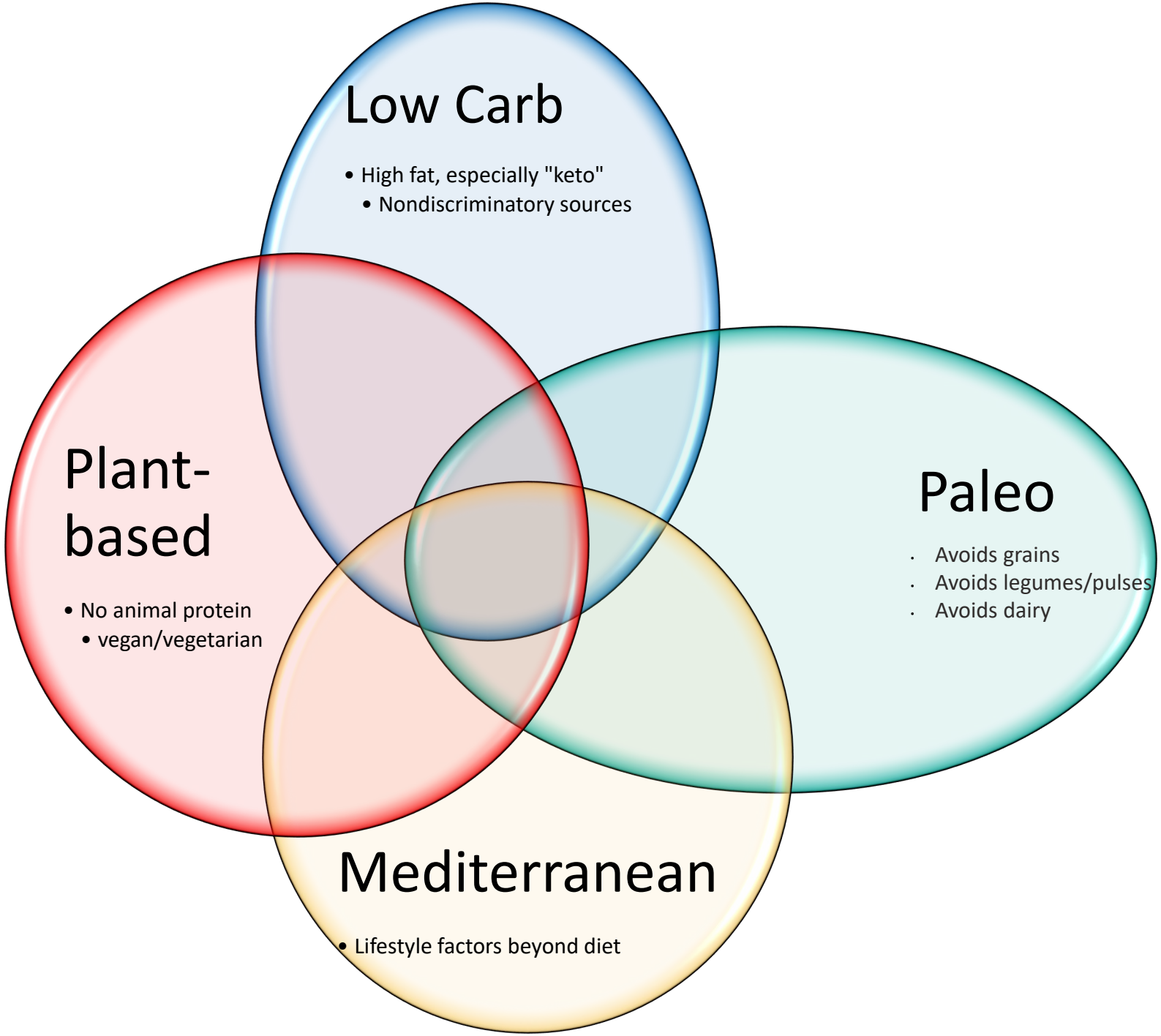
Vegetarian Diet

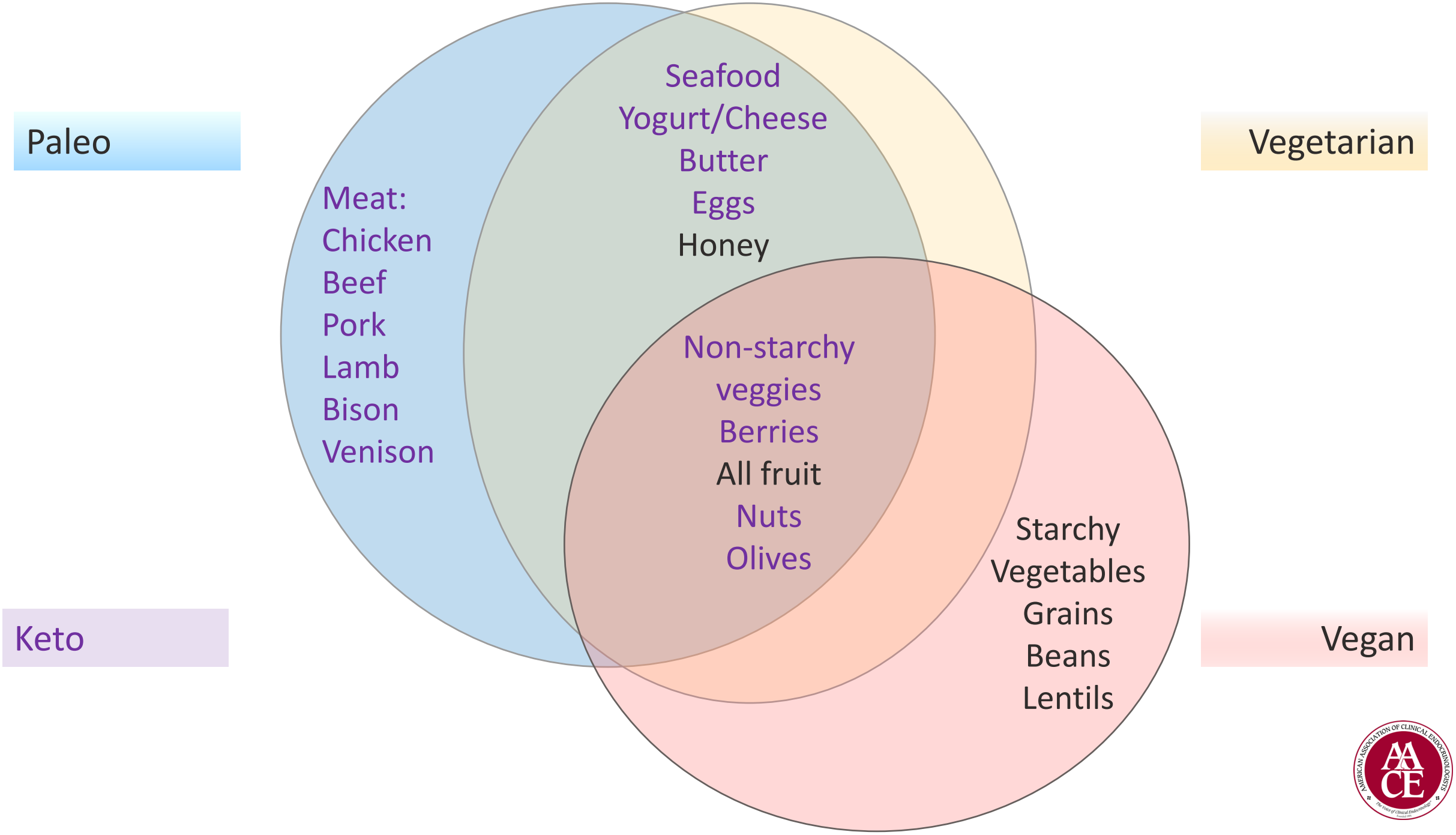
- Plant-based diet with more restrictions based on type of diet:
  - **Lacto-vegetarian** diets exclude meat, fish, poultry and eggs, as well as foods that contain them. Dairy products, such as milk, cheese, yogurt and butter, are allowed.
  - **Ovo-vegetarian** diets exclude meat, poultry, seafood and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


Paleo
Vegetarian
Keto
Vegan
Meat:
Chicken
Beef
Pork
Lamb
Bison
Venison
Seafood
Yogurt/Cheese
Butter
Eggs
Honey
Non-starchy
veggies
Berries
All fruit
Nuts
Olives
Starchy
Vegetables
Grains
Beans
Lentils

Nutrients

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

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

Antoni R, et al. Proc Nutr Soc. 2017 Aug;76(3):361-368. Patterson RE, et al. Annu Rev Nutr. 2017 Aug 21;37:371-393.

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

1. Johnston BC, et al. JAMA. 2014 Sep 3;312(9):923-933.

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

Lee I-M, et al. Lancet. 2012 July 21;380(9838):219-229. WHO 2012.
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[1]

1. Thornton JS, et al. Br J Sports Med. 2016;50:1109-1114.

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.

https://health.gov/paguidelines/second-edition/pdf/Physical_Activity_Guidelines_2nd_edition.pdf#page=55; accessed on January 6, 2020.

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

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

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

Kushner RF. *Circulation*. 2012;126:2870-2877.

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 efficiency[2]
- Many pituitary hormones are circadian[3]
  - 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 expenditure[2,4,5]
  - 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,]

1.Xu T, et al. Crit Rev Food Sci Nutr. 2019;59(6):882-892.
2.Poggiogalle E, et al. Metabolism. 2018 Jul;84:11-27.
3.Zarrinpar A, et al. Trends Endocrinol Metab. 2016 Feb;27(2):69-83.
4.Hodkinson DJ, et al. J Cereb Blood Flow Metab. 2014 Sep;34(9):1493-1499.
5.Tahara Y, et al. J Physiol Sci. 2017 Jan;67(1):1-10.
6.Gooley JJ. Proc Nutr Soc. 2016 Nov;75(4):440-450.
7.Nobs SP, et al. EMBO Rep. 2019 Apr;20(4).
8.Tan E, et al. Curr Opin Clin Nutr Metab Care. 2014 Jul;17(4):343-348.

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]

1.Ruddick-Collins LC, et al. Nut Bull. 2017;43:174-183. 2. Tahara Y, et al. J Physiol Sci. 2017 Jan;67(1):1-10.

Effects of Medications on Weight

	Promote Weight Gain	Promote Weight Loss or Maintenance
Antipsychotics/Neurologic Agents	Antipsychotics	Ziprasadone (Geodon)
	Antidepressants	Citalopram (Celexa)
	Lithium	Bupropion (Welbutrin)
	Antiepileptic	Topiramate (Topamax)
Steroid hormones	Prednisone/prednisolone	Estrogen, progestins
	Oral contraceptives	
Diabetic agents	Sulfonylureas, Thiazolidinediones, Insulin	Metformin, GLP-1 agonists, Pramlintide, α-glucosidase inhibitors, SGLT-2 inhibitors
Antihypertensive agents	Beta-adrenergic blockers	ACE inhibitors
Asthma-related medications	Antihistamines	Inhalers
Pain medication	Opioids	

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

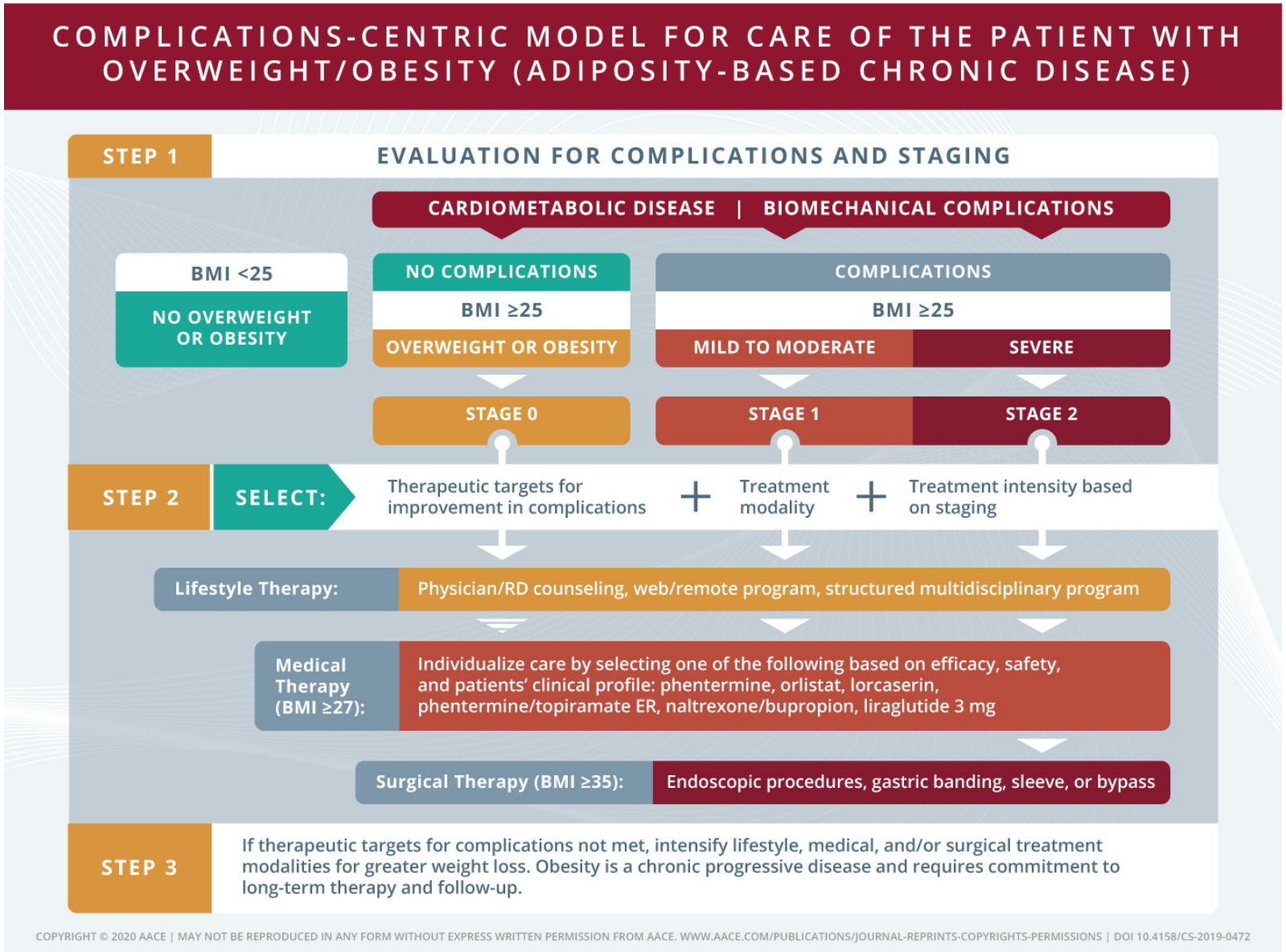
Always as an adjunct to an energy-deficit meal plan, increased physical activity and behavior modification.

Initiate Changes

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



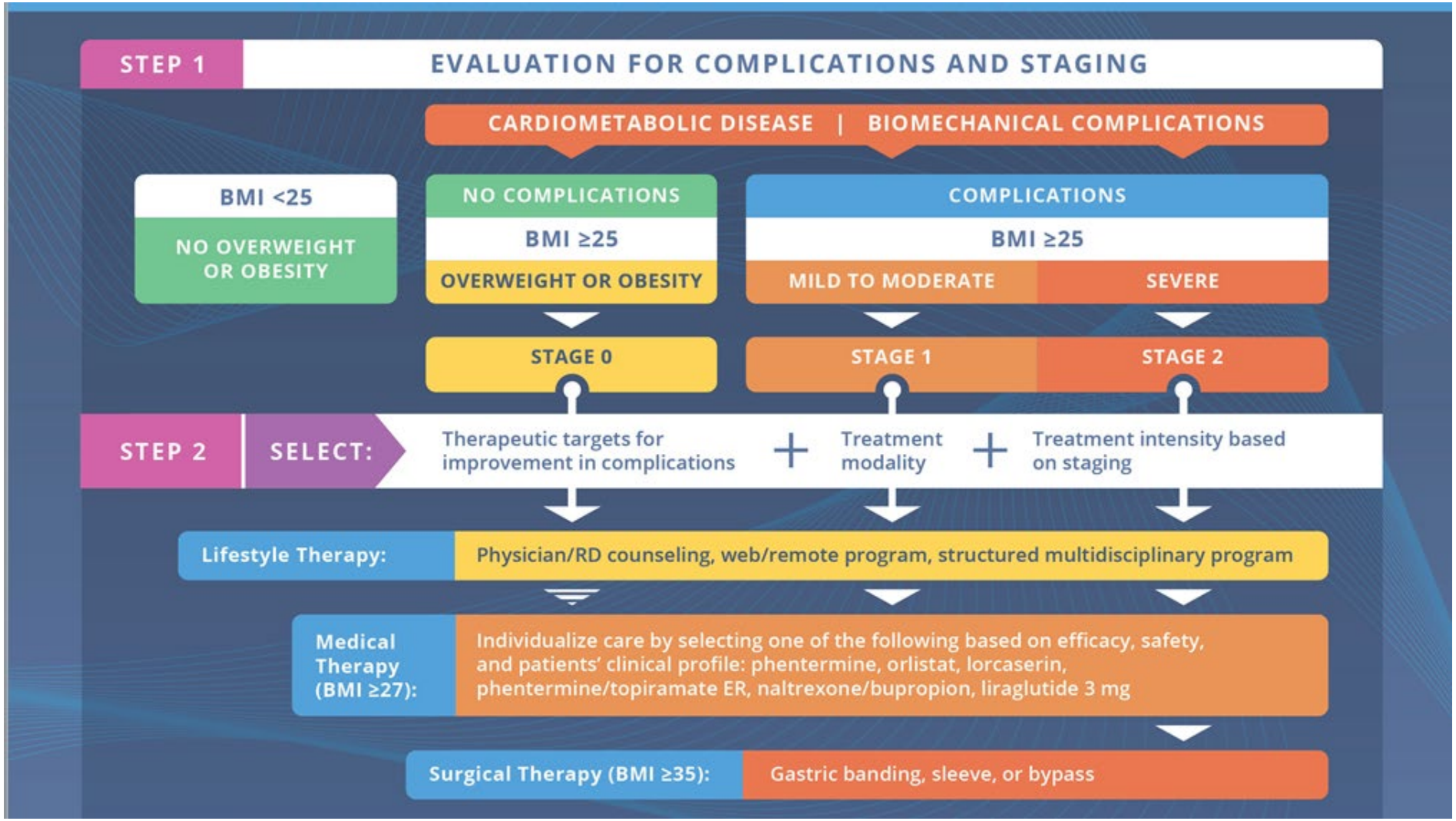
Surgery Overview

- 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.

Check out the latest in surgery options: https://www.aace.com/sites/default/files/2018-11/3.4.bariatric-surgery.pdf

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

Evaluation


STEP 1
EVALUATION FOR COMPLICATIONS AND STAGING
CARDIOMETABOLIC DISEASE | BIOMECHANICAL COMPLICATIONS
BMI <25
NO OVERWEIGHT OR OBESITY
NO COMPLICATIONS
BMI ≥25
OVERWEIGHT OR OBESITY
COMPLICATIONS
BMI ≥25
MILD TO MODERATE
SEVERE
STAGE 0
STAGE 1
STAGE 2
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

KEY: PREFERRED DRUG | USE WITH CAUTION | AVOID

CLINICAL CHARACTERISTICS OR CO-EXISTING DISEASES		MEDICATIONS FOR CHRONIC WEIGHT MANAGEMENT			
		Orlistat	Phentermine/ topiramate ER	Naltrexone ER/ bupropion ER	Liraglutide 3 mg
Diabetes Prevention (metabolic syndrome, prediabetes)				Insufficient data for T2DM prevention	
Type 2 Diabetes Mellitus					
Hypertension			Monitor heart rate	Monitor BP and heart rate Contraindicated in uncontrolled HTN	Monitor heart rate
Cardiovascular Disease	CAD		Monitor heart rate	Monitor heart rate, BP	Monitor heart rate
	Arrhythmia		Monitor heart rate, rhythm	Monitor heart rate, rhythm, BP	Monitor heart rate, rhythm
	CHF	Insufficient data	Insufficient data	Insufficient data	Insufficient data
Chronic Kidney Disease	Mild (50–79 mL/min)				
	Moderate (30–49 mL/min)		Do not exceed 7.5 mg/46 mg per day	Do not exceed 8 mg/90 mg bid	
	Severe (<30 mL/min)	Watch for oxalate nephropathy	Urinary clearance of drug	Urinary clearance of drug	Avoid vomiting and volume depletion
Nephrolithiasis		Calcium oxalate stones	Calcium phosphate stones		
Hepatic Impairment	Mild-Moderate (Child-Pugh 5–9)	Watch for cholelithiasis	Do not exceed 7.5 mg/46 mg per day	Do not exceed 8 mg/90 mg in AM	Watch for cholelithiasis
	Severe (Child-Pugh >9)	Not recommended	Not recommended	Not recommended	Not recommended
Depression			Avoid maximum dose: 15 mg/92 mg per day	Insufficient safety data Avoid in adolescents and young adults	

Anxiety			Avoid max dose: 15 mg/92 mg per day		
Psychoses		Insufficient data	Insufficient data	Insufficient data	Insufficient data
Binge Eating Disorder			Insufficient data; however, possible benefit based on studies with topiramate	Insufficient data, though possible benefit based on studies with bupropion Avoid in patients with purging or bulimia nervosa	Insufficient data
Glaucoma			Contraindicated, may trigger angle closure	May trigger angle closure	
Seizure Disorder			If discontinuing from max dose, taper slowly	Bupropion lowers seizure threshold	
Pancreatitis		Monitor for symptoms			Monitor for symptoms Avoid if prior or current disease
Opioid Use				Will antagonize opioids and opiates	
Women of Reproductive Potential	**Pregnancy**	Use contraception and discontinue orlistat should pregnancy occur	Use contraception and discontinue phentermine/topiramate should pregnancy occur (perform monthly pregnacy checks to identify early pregnancy)	Use contraception and discontinue naltrexone ER/bupropion ER should pregnancy occur	Use contraception and discontinue liraglutide 3 mg should pregnancy occur
	Breast-feeding	Not recommended	Not recommended	Not recommended	Not recommended
Age ≥65 years *		Limited data available	Limited data available	Insufficient data	Limited data available
Alcoholism/ Addiction			Insufficient data, though topiramate might exert therapeutic benefits	Avoid due to seizure risk and lower seizure threshold on bupropion	
Post-Bariatric Surgery		Insufficient data	Limited data available	Insufficient data	Data available at 1.8 – 3.0 mg/day

* 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.

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