Obesity as a Disease: Prevention and Management

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American Board of Obesity Medicine Diplomate

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Disclosure

No conflict of interest

Objectives

1

Define and classify the disease of Obesity

2

Present the epidemiology and determinants of Obesity

3

Review briefly the common causes for Obesity

4

Discuss prevention and treatment strategies to manage Obesity

Definition

Obesity Definition

- Obesity Medicine Association (OMA)

  *"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."*

Bays HE, McCarthy W, Christensen S, Tondt J, Karjoo S, Davisson L, Ng J, Golden A, Burridge K, Conroy R, Wells S, Umashanker D, Afreen S, DeJesus R, Salter D, Shah N. Obesity Algorithm eBook, presented bythe Obesity Medicine Association. www.obesityalgorithm.org. 2020. https://obesitymedicine.org/obesity-algorithm/ (Accessed 12/8/2020)

Obesity Is a Disease When…

- The patient has excessive body fat, as assessed by reliable measures
- Excessive body fat is caused by genetic or developmental errors, infections, hypothalamic injury, adverse reactions to medications, nutritional imbalance, and/or unfavorable environmental factors
- Excessive body fat results in pathogenic structural or functional abnormalities resulting in increased patient morbidity and mortality
- Multiple pathogenic adipocyte and/or adipose tissue endocrine and immune dysfunctions contribute to metabolic disease (adiposopathy or "sick fat" disease)
- Multiple pathogenic physical forces from excessive body fat cause stress damage to other body tissues (fat mass disease)

The adverse health consequences of increased body fat are not simply "co-morbidities" or "associated risk factors"

Obesity Medicine Association

Bays HE, McCarthy W, Christensen S, Seger J, Wells S, Long J, Shah NN, Primack C. Obesity Algorithm Slides, presented by the Obesity Medicine Association. www.obesityalgorithm.org. 2019. https://obesitymedicine.org/obesity-algorithm/ (Accessed September 17, 2020).

Obesity Terminology

"People-first" language recognizes the potential hazards of referring to or labeling individuals by their disease. Thus, **"patient who is overweight or has obesity" or "patient with overweight or obesity"** are preferred over "obese patient." This is similar to the standard with other diseases, such as diabetes mellitus, wherein "patient with diabetes" is preferred over "diabetic patient."

Encouraged Terms

- Weight
- Unhealthy weight
- Overweight
- Body mass index
- Excessive energy stores
- Affected by obesity

Discouraged Terms

- Morbidly obese
- Obese
- Fat

Obesity Medicine Association

Bays HE, McCarthy W, Christensen S, Seger J, Wells S, Long J, Shah NN, Primack C. Obesity Algorithm Slides, presented by the Obesity Medicine Association. www.obesityalgorithm.org. 2019. https://obesitymedicine.org/obesity-algorithm/ (Accessed September 17, 2020).

Classification

Anthropometric components of Obesity: BMI

- Body mass index (BMI) is an accepted **surrogate** marker of body adiposity
  - Expresses body weight as a function of body height

BMI Formula

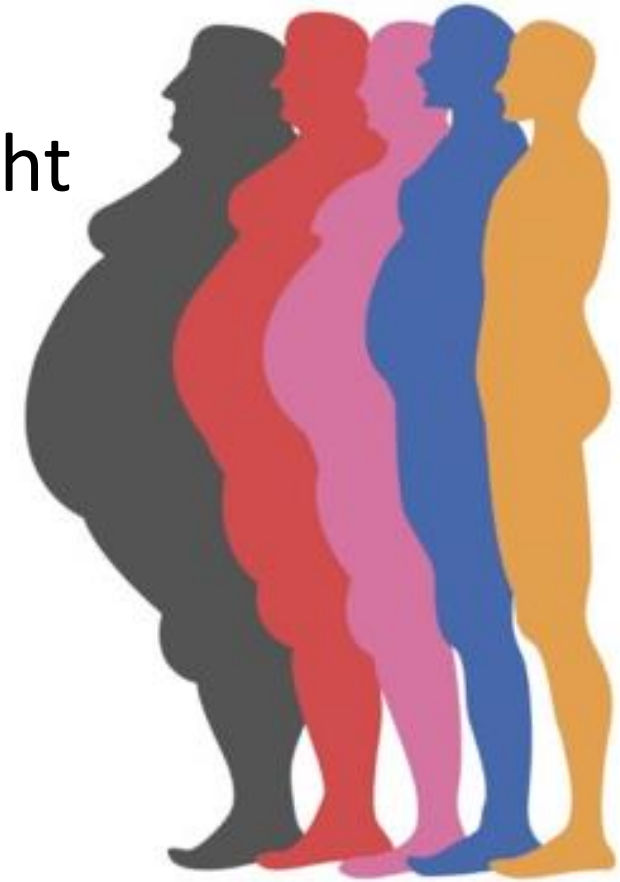
thecalculatorsite.com

METRIC

$$BMI = \text{weight (kg)} / [\text{height (m)}]^2$$

IMPERIAL

$$BMI = 703 \times \text{weight (lbs)} / [\text{height (in)}]^2$$

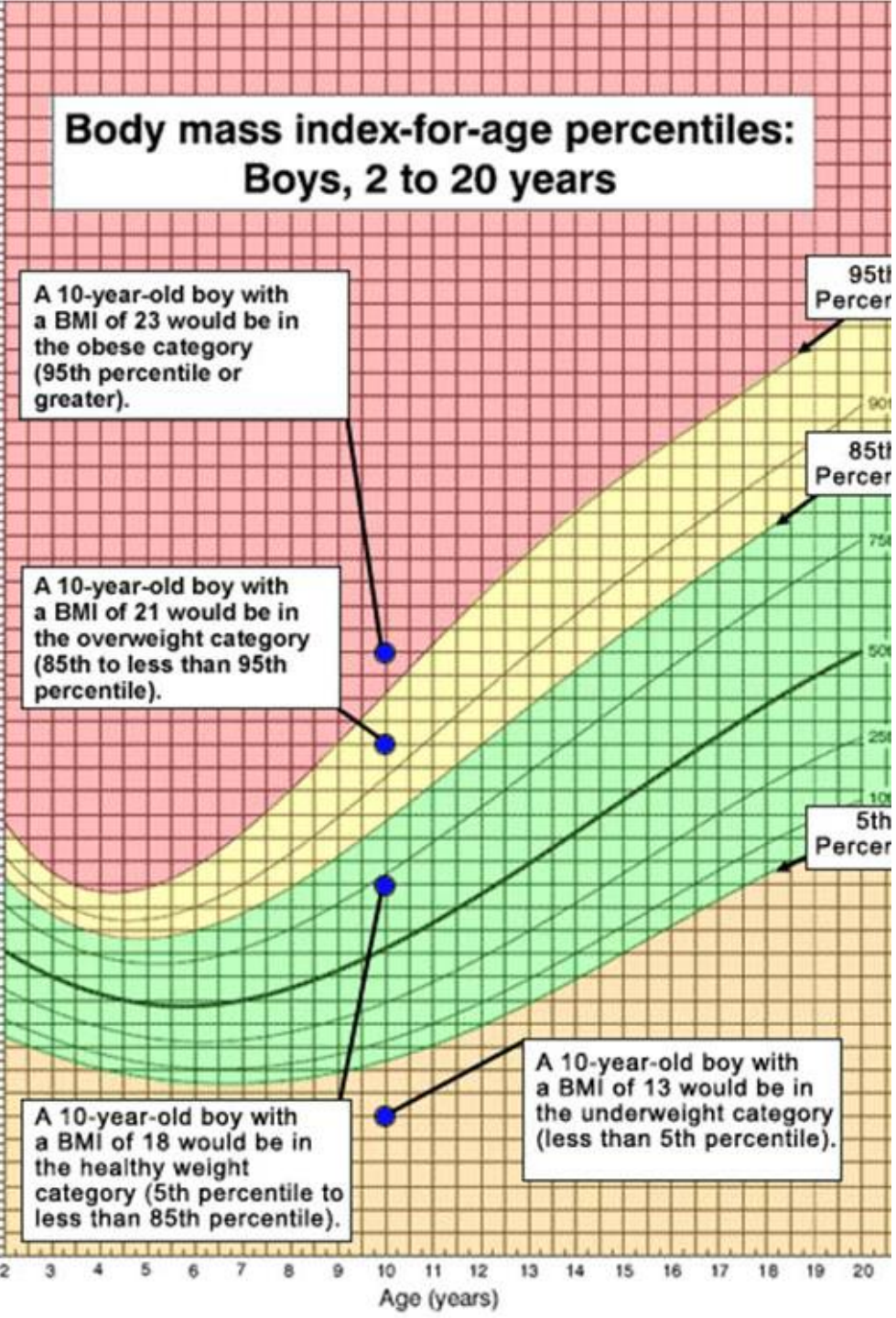


Anthropometric components of Obesity: BMI

- Degree of obesity can be further subcategorized into classes according to BMI

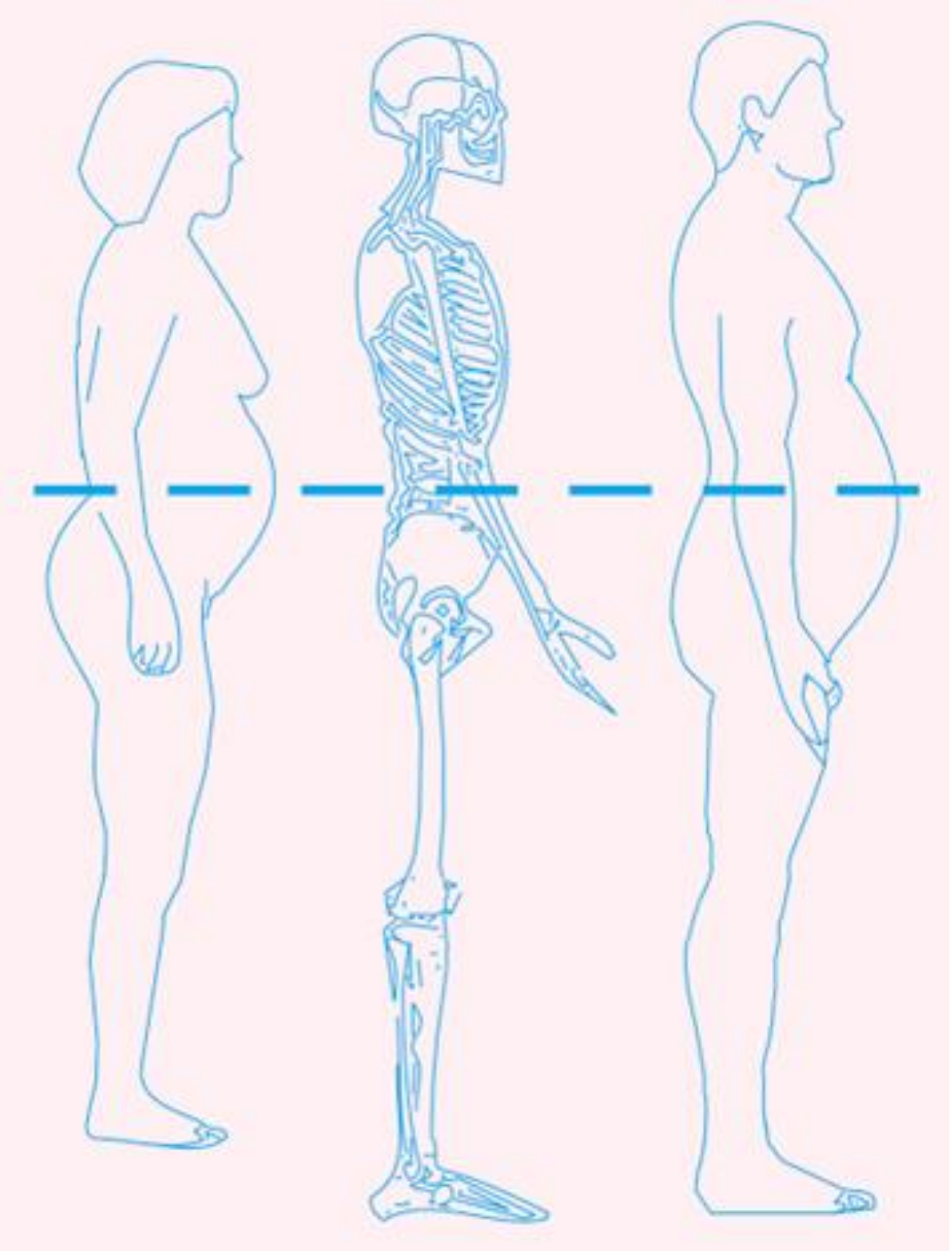
Underweight	< 18.5
Normal range	18.5 - 24.9
Overweight	⩾ 25.0
Preobese	25.0 - 29.9
Obese	⩾ 30.0
Obese class I	30.0 - 34.9
Obese class II	35.0 - 39.9
Obese class III	⩾ 40.0

Class 1 Class 2 Class 3



Measuring Obesity in Children

- For children, distribution of BMI changes with age, just as weight and height distributions change.
- Instead of using absolute BMI (adults), children use BMI percentiles specific for age and weight to determine underweight, healthy weight, overweight and obesity
- Percent BMI (%BMI) is determined by plotting the child's BMI for his or her weight on the CDC BMI curves.
- Separate BMI curves exist for boys and girls



Anthropometric Components of Obesity: Waist Circumference

- Measured with a flexible tape placed on a horizontal plane at the level of the iliac crest, without compressing the skin

- Measurement is done at the end of normal expiration

Reproduced from: National Heart, Lung, and Blood Institute. The Practical Guide: Identification, Evaluation, and Treatment of Overweight and Obesity in Adults. US Department of Health and Human Services, Public Health Service, National Institutes of Health, National Heart Lung and Blood Institute, Bethesda, MD, October 2000.

Weight and Waist Circumference as Predictors of Disease Risk

Classification of Overweight and Obesity by BMI, Waist Circumference, and Associated Disease Risk*

	BMI (kg/m2)	Obesity Class	Disease Risk* (Relative to Normal Weight and Waist Circumference)	
			Men ≤40 in (≤ 102 cm) Women ≤ 35 in (≤ 88 cm)	> 40 in (> 102 cm) > 35 in (> 88 cm)
Underweight	< 18.5		-	-
Normal†	18.5–24.9		-	-
Overweight	25.0–29.9		Increased	High
Obesity	30.0–34.9	I	High	Very High
	35.0–39.9	II	Very High	Very High
Extreme Obesity	≥ 40	III	Extremely High	Extremely High

* Disease risk for type 2 diabetes, hypertension, and CVD.

† Increased waist circumference can also be a marker for increased risk even in persons of normal weight.

Adapted from "Preventing and Managing the Global Epidemic of Obesity. Report of the World Health Organization Consultation of Obesity." WHO, Geneva, June 1997.[26]

Practical Guide to the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults. HHLBI. No. 00-4084 2000.

Anthropometric components of Obesity: Body Fat Percentage

Body Fat Percentage		
Description	**Men**	**Women**
Essential Fat	2-5%	10-13%
Athletes	6-13%	14-20%
Fitness	14-17%	21-24%
Average	18-24%	25-31%
Obese	**25% +**	**32% +**

*Distinguishes between Fat and Muscle mass
*Useful to evaluate malnourished patients, high levels of visceral fat, sarcopenia, bodybuilders

Composition Analysis Measuring Tools

- Calipers
- Dual Energy X-Ray Absorptiometry (DEXA)
- Bioelectrical impedance
- Air displacement plethysmography (BOD POD)
- MRI or CT scans

Epidemiology

Prevalence of Obesity Among U.S. Adults 2017-2018

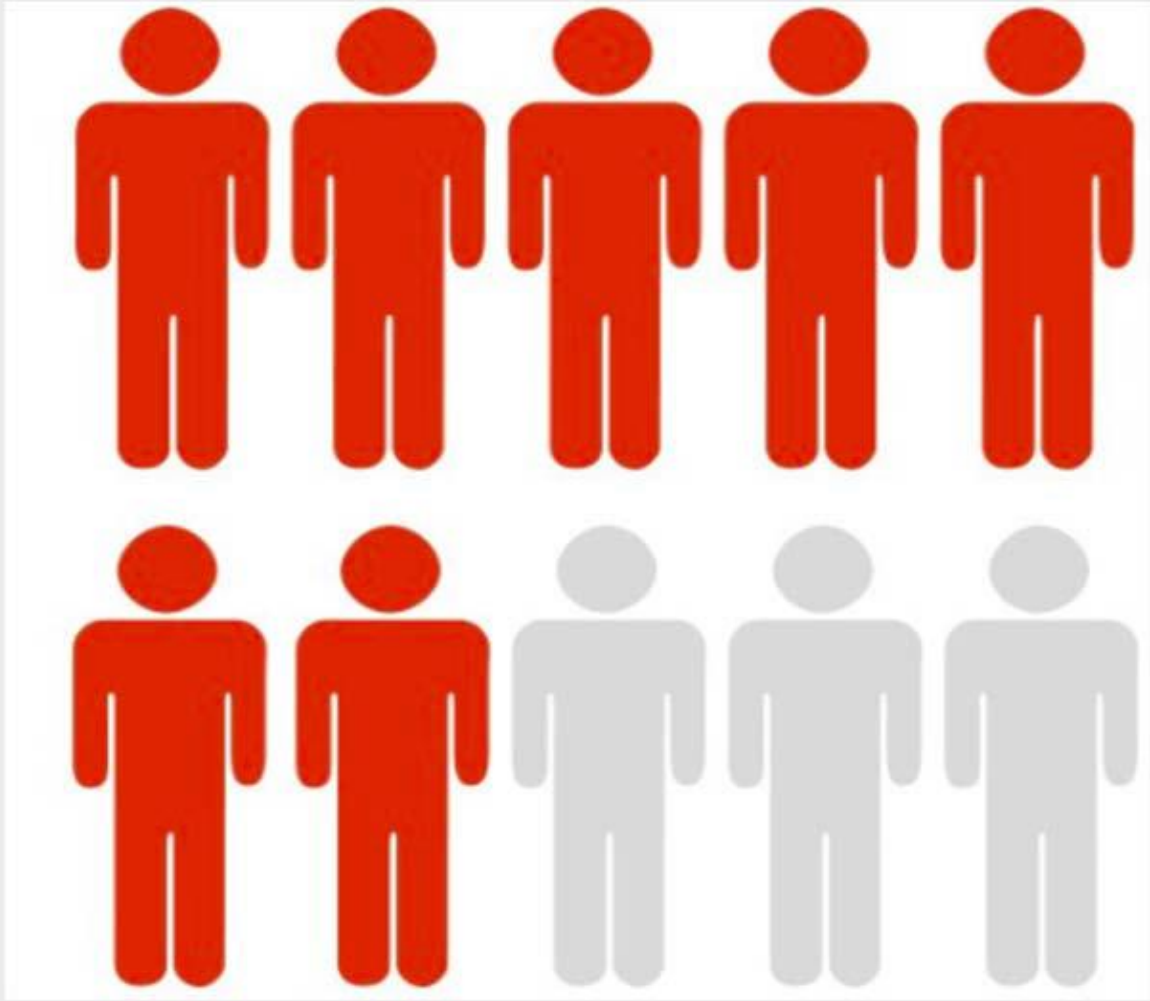
42.4%

BMI >29.9kg/m^2

Obesity is the most common chronic disease in the U.S

https://www.cdc.gov/obesity/data/adult.html

U.S. Adults with BMI >24.9kg/m^2

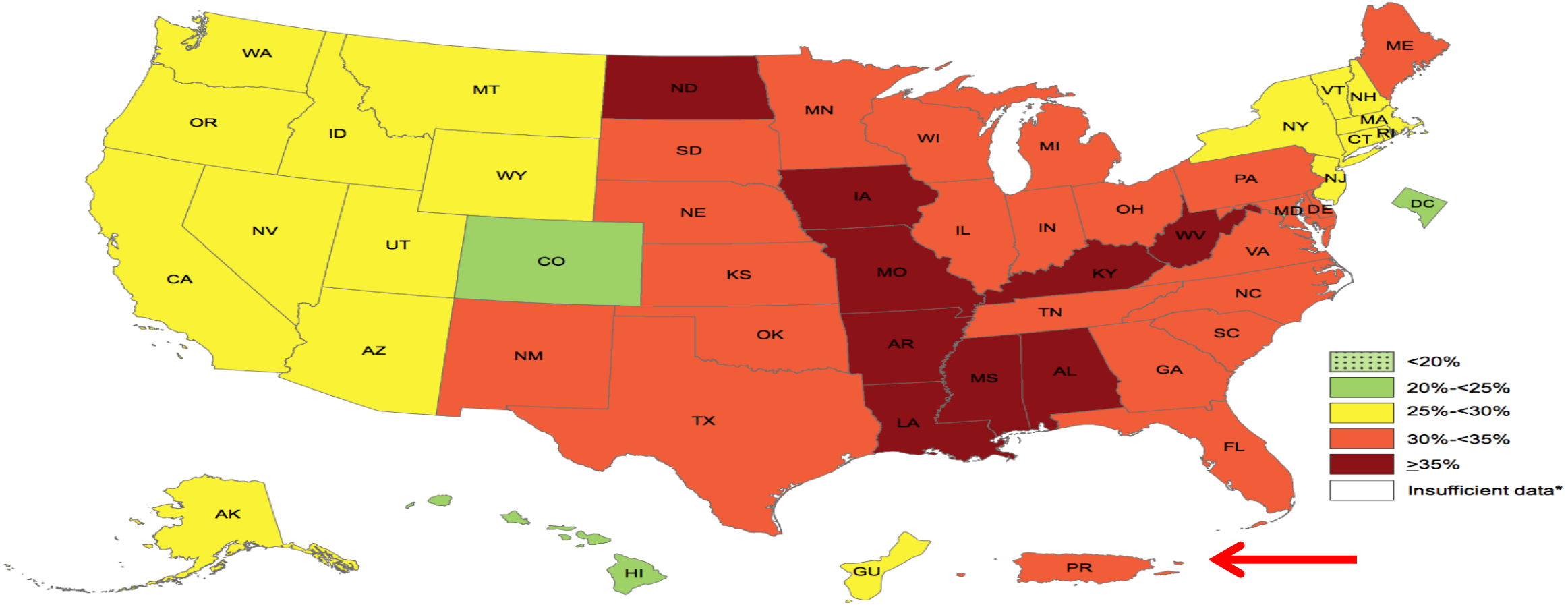


71.6%

https://www.cdc.gov/nchs/fastats/obesity-overweight.htm

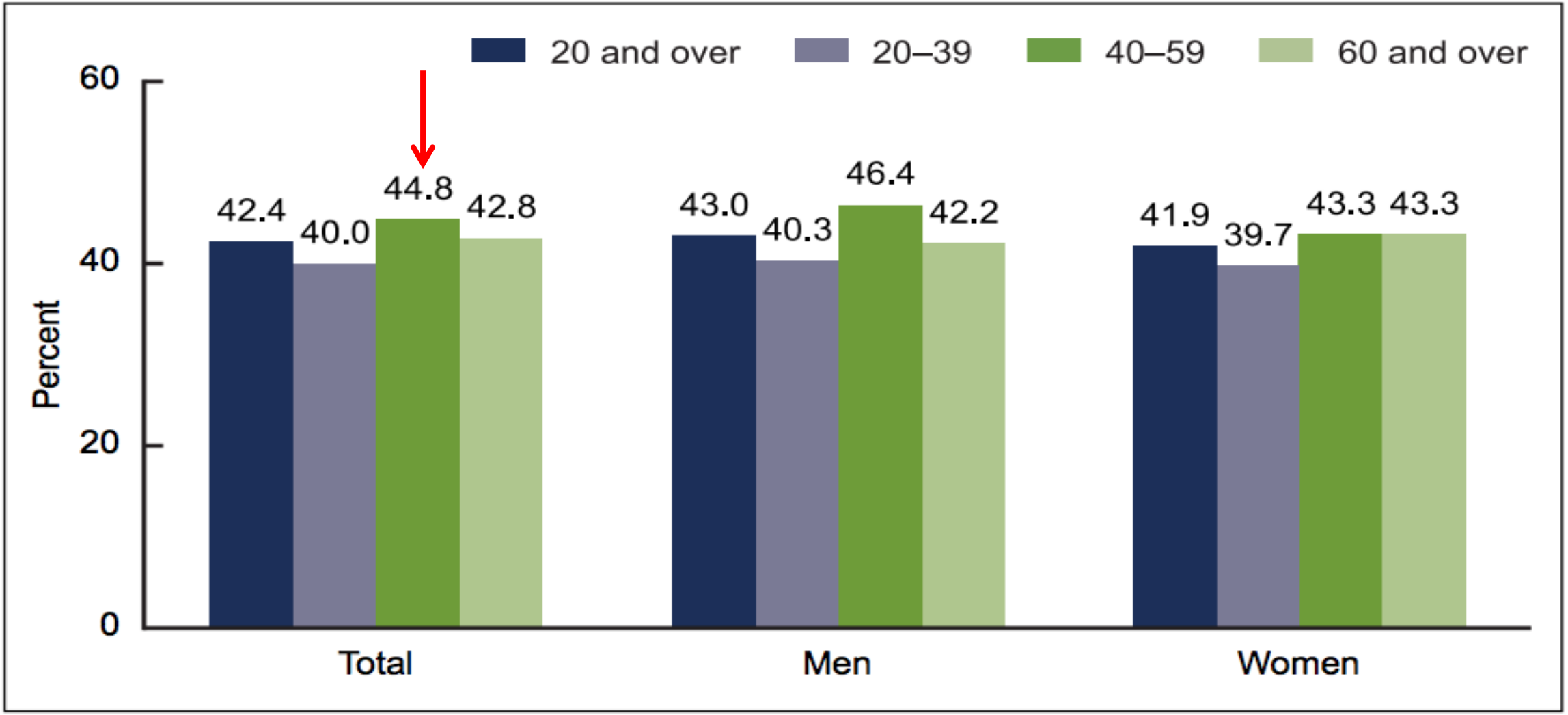
Prevalence† of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2018

†Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.



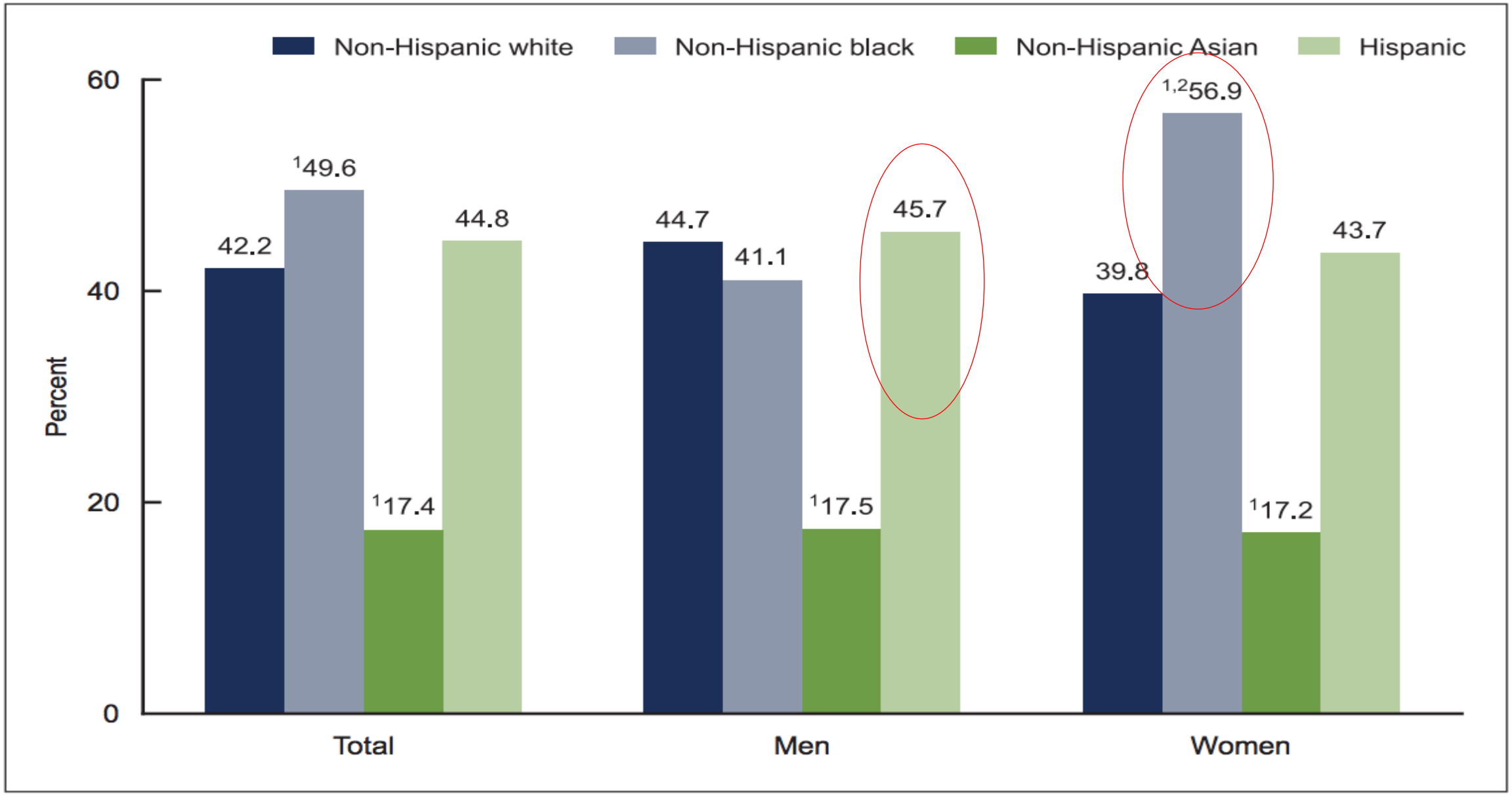
https://www.cdc.gov/obesity/data/prevalence-maps.html

Figure 1. Prevalence of obesity among adults aged 20 and over, by sex and age: United States, 2017–2018



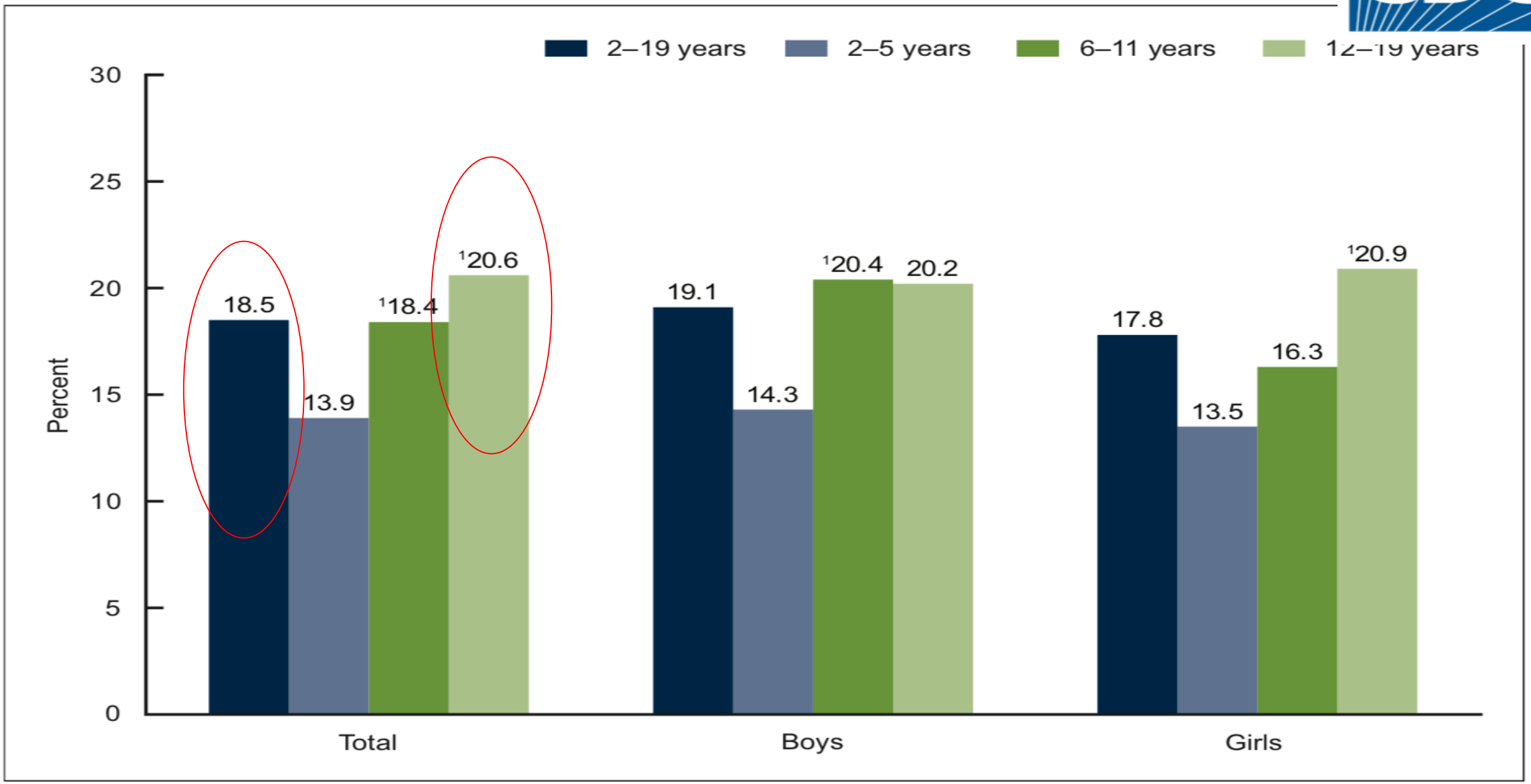
NCHS Data Brief, Number 360, February 2020

Figure 2. Age-adjusted prevalence of obesity among adults aged 20 and over, by sex and race and Hispanic origin: United States, 2017–2018



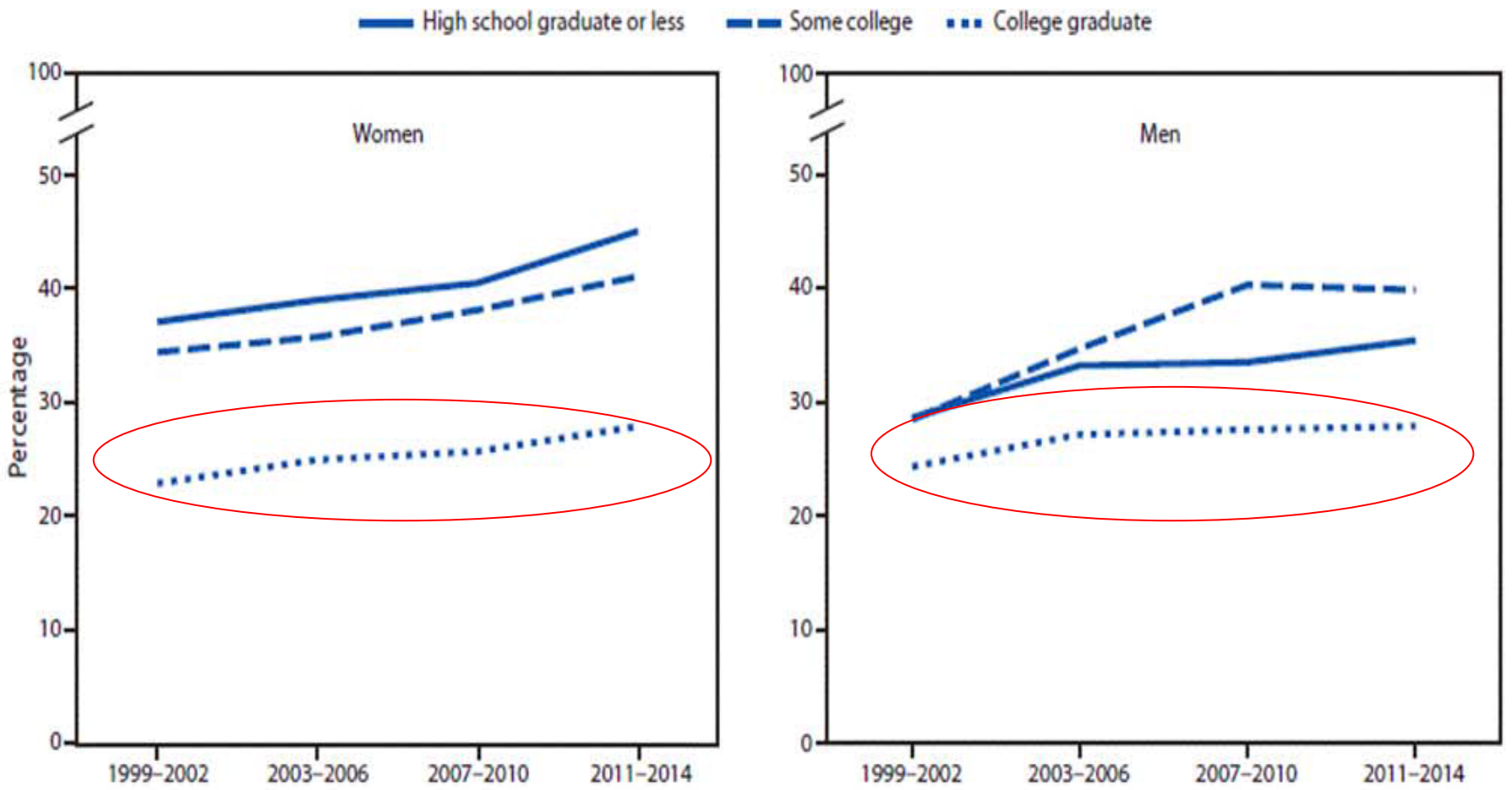
NCHS Data Brief, Number 360, February 2020

Figure 3. Prevalence of obesity among youth aged 2–19 years, by sex and age: United States, 2015–2016



NCHS Data Brief, Number 288, October 2017

FIGURE 2. Obesity prevalence among adults, by education level and sex — National Health and Nutrition Examination Survey, 1999–2002 to 2011–2014*†



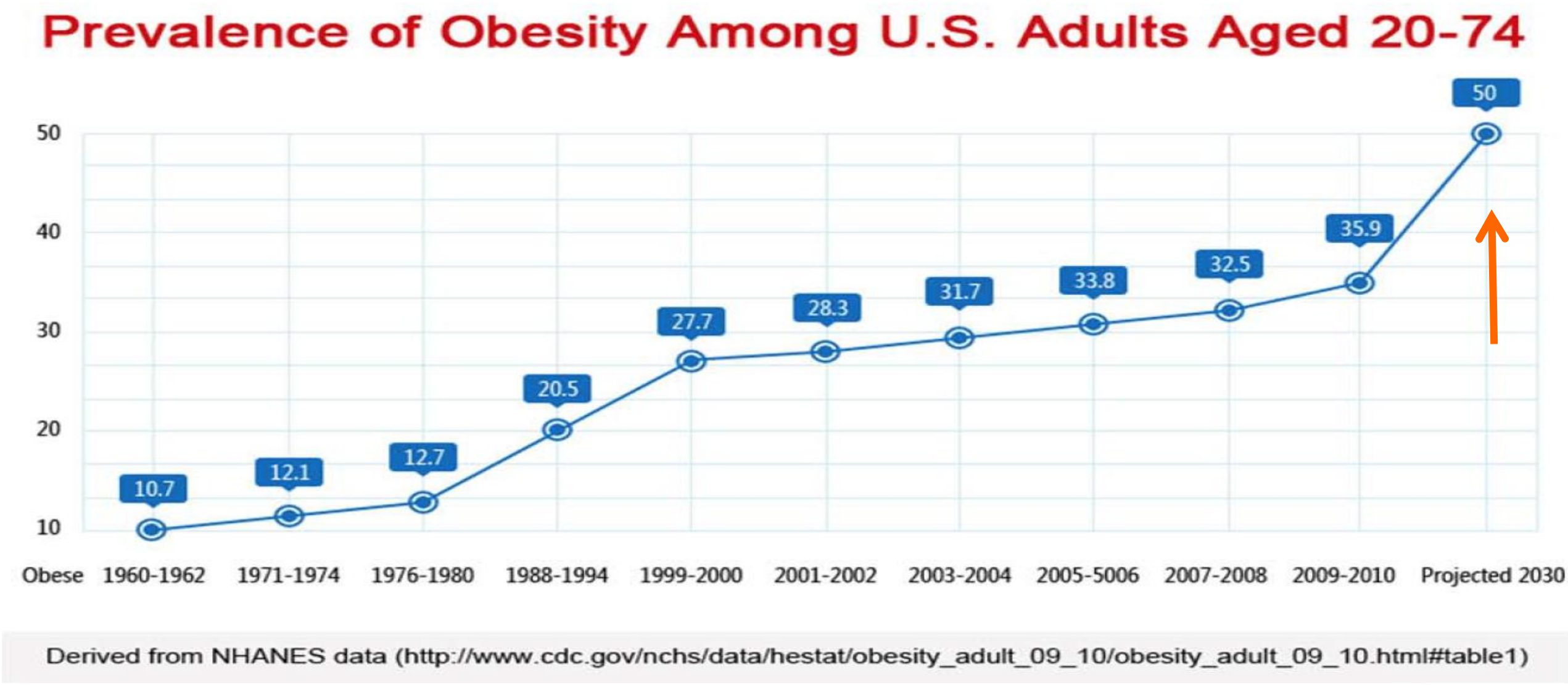
* Estimates age-adjusted by the direct method to the 2000 projected U.S. Census population using the age groups 20–39, 40–59, and ≥60 years.

† Significant linear trends for all groups ($p<0.01$) except men who were college graduates. For women college graduates $p = 0.056$.

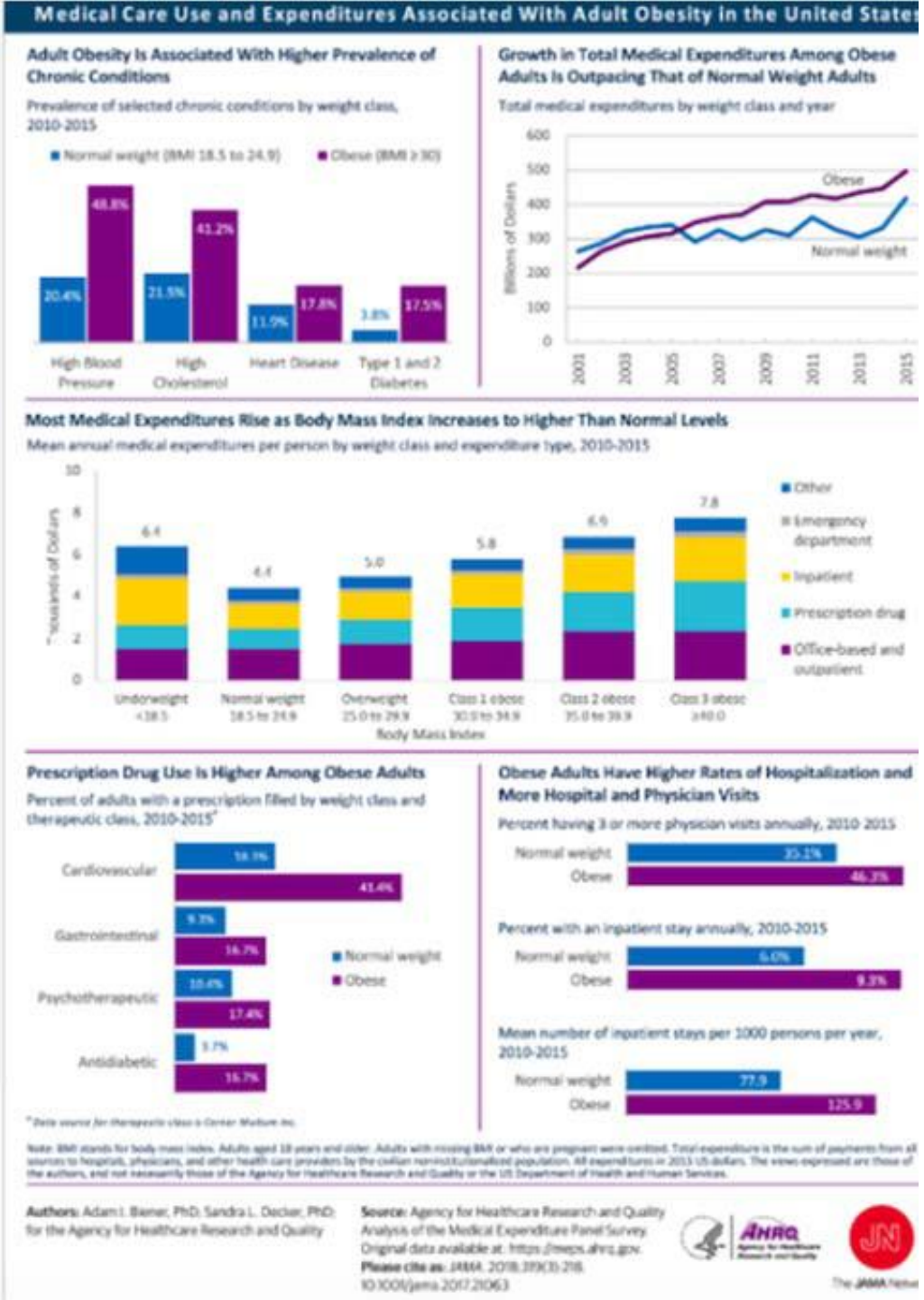
The figure above is a line graph showing the prevalence of obesity among adults, by education level and sex, from 1999–2002 to 2011–2014.

- Men and women with college degrees had lower obesity prevalence compared with those with less education

Our future?



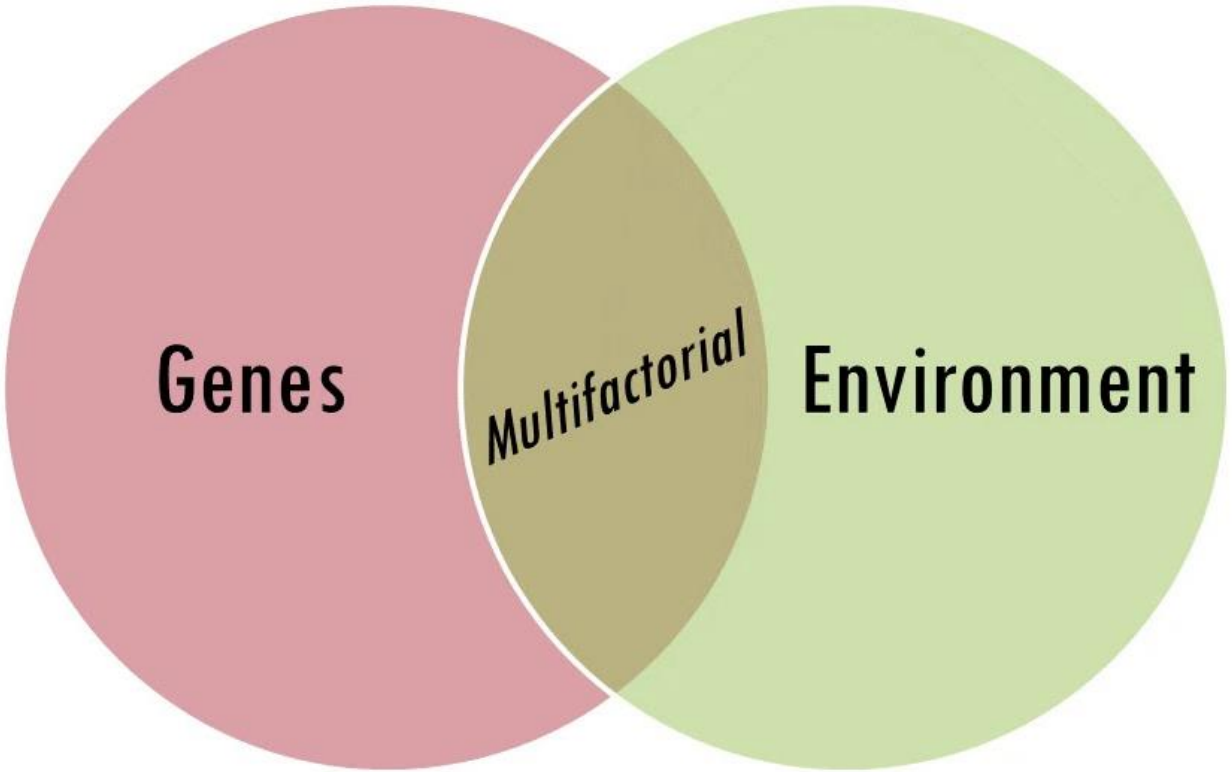
Slide Adapted from Alexander L. Epidemiology and determinants of obesity. Review Course ABOM. OMA. September 2018



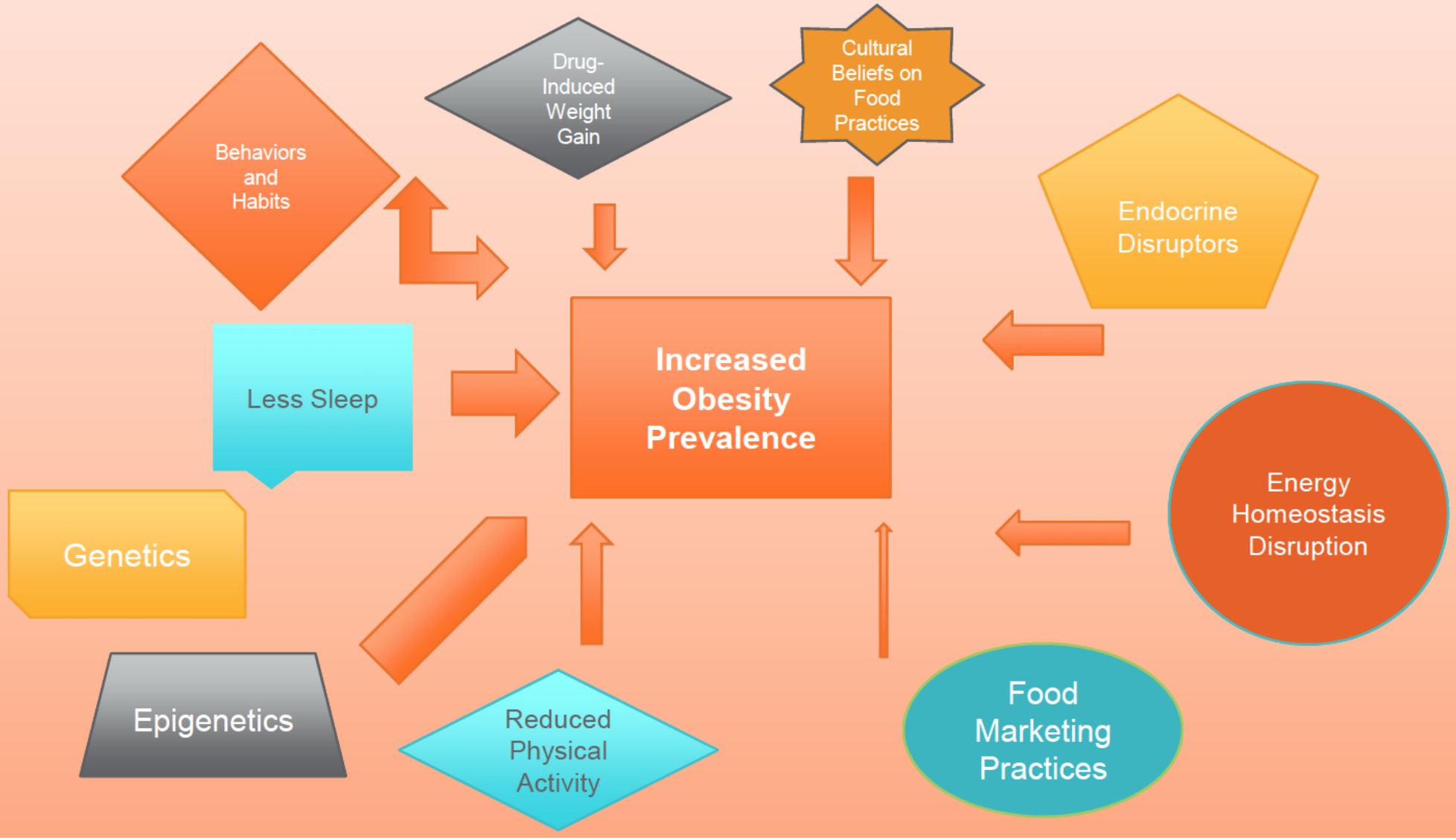
Healthcare Cost of Obesity

- Obesity is associated with higher:
  - Growth in total medical expenditure
  - Prevalence of chronic conditions
  - Rates of hospitalizations
  - Physician visits
  - Prescription drug use
  - Increased mortality

https://jamanetwork.com/journals/jama/fullarticle/2669713

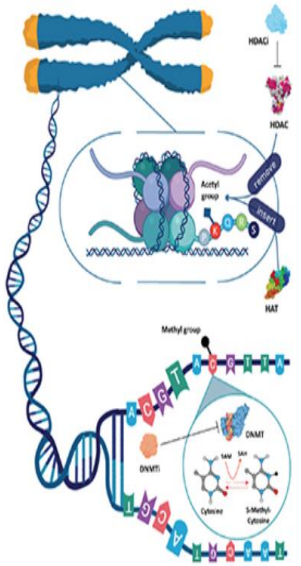


Obesity Causes



Obesity is Multifactorial

Epigenetics



- Modification of gene expression rather than alteration of the genetic code itself / heritable changes which affect gene function without modifying DNA sequence
  - Gene-environment
    - Including intrauterine environment
    - DNA methylation patterns can be affected by maternal diet; modifications can persist for decades,
  - Gene-behavior
    - Epigenetic changes introduced during early development may increase risk of obesity

Slide Adapted from Alexander L. Epidemiology and determinants of obesity. Review Course ABOM. OMA. September 2018

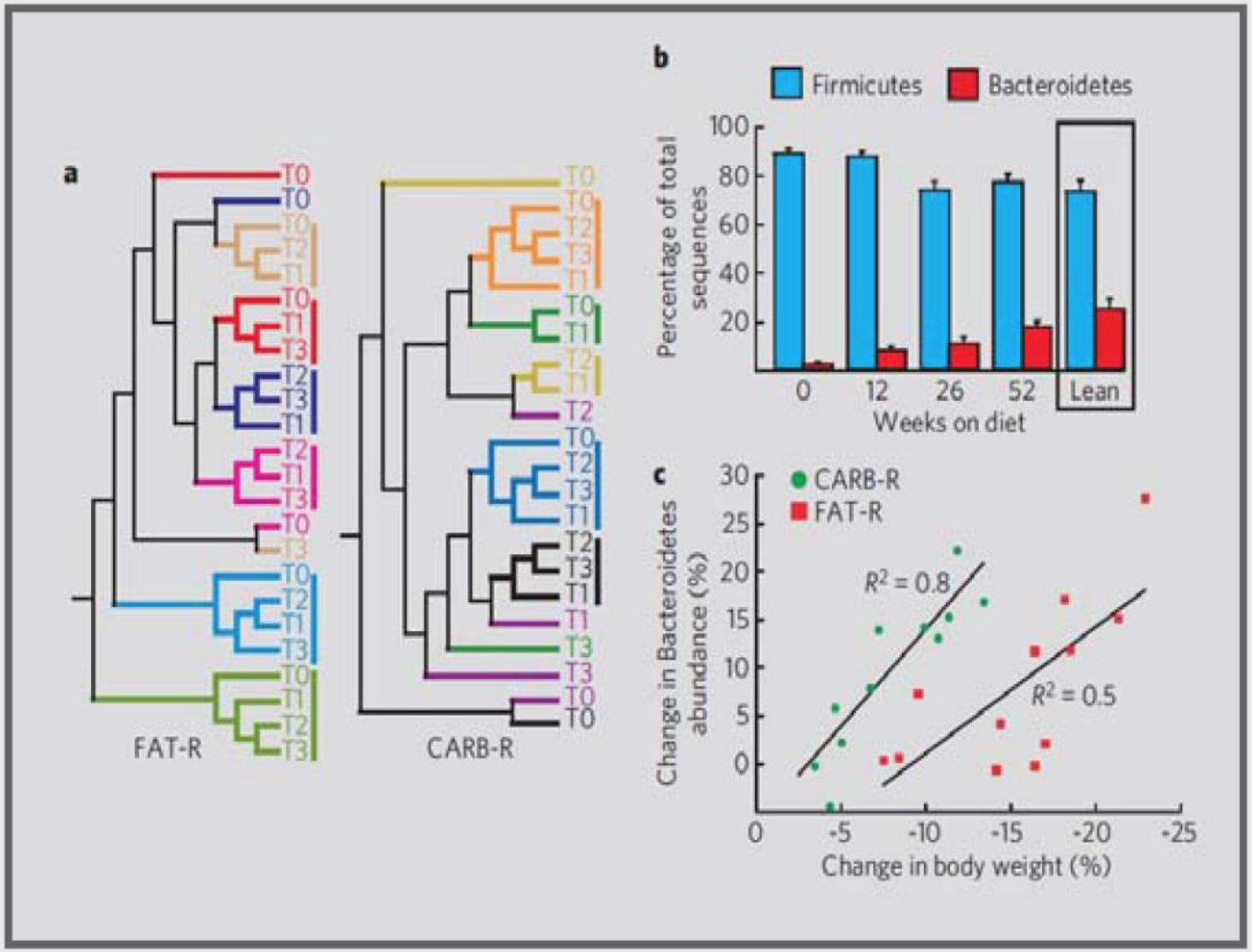
Obesity: Extragenetic Etiology/Causes

Extragenetic

- Environment (family, home, geographic location)
- Culture
- Lack of optimal nutrition and physical activity
- Disrupted sleep (e.g., poor quality, too little, or too much)
- Adverse consequences of medications
- Mental stress
- Neurologic dysfunction (central nervous system trauma, hypothalamic inflammation, leptin resistance)
- Viral infections
- Gut microbiota neurologic signaling and transmission of pro-inflammatory state

Bays HE, McCarthy W, Christensen S, Seger J, Wells S, Long J, Shah NN, Primack C. Obesity Algorithm Slides, presented by the Obesity Medicine Association. www.obesityalgorithm.org. 2019. https://obesitymedicine.org/obesity-algorithm/ (Accessed September 17, 2020).

“Bacteroides : firmicutes” ratio is low in obesity and can be altered with diet



Analysis of gut microbial ecology in obesity

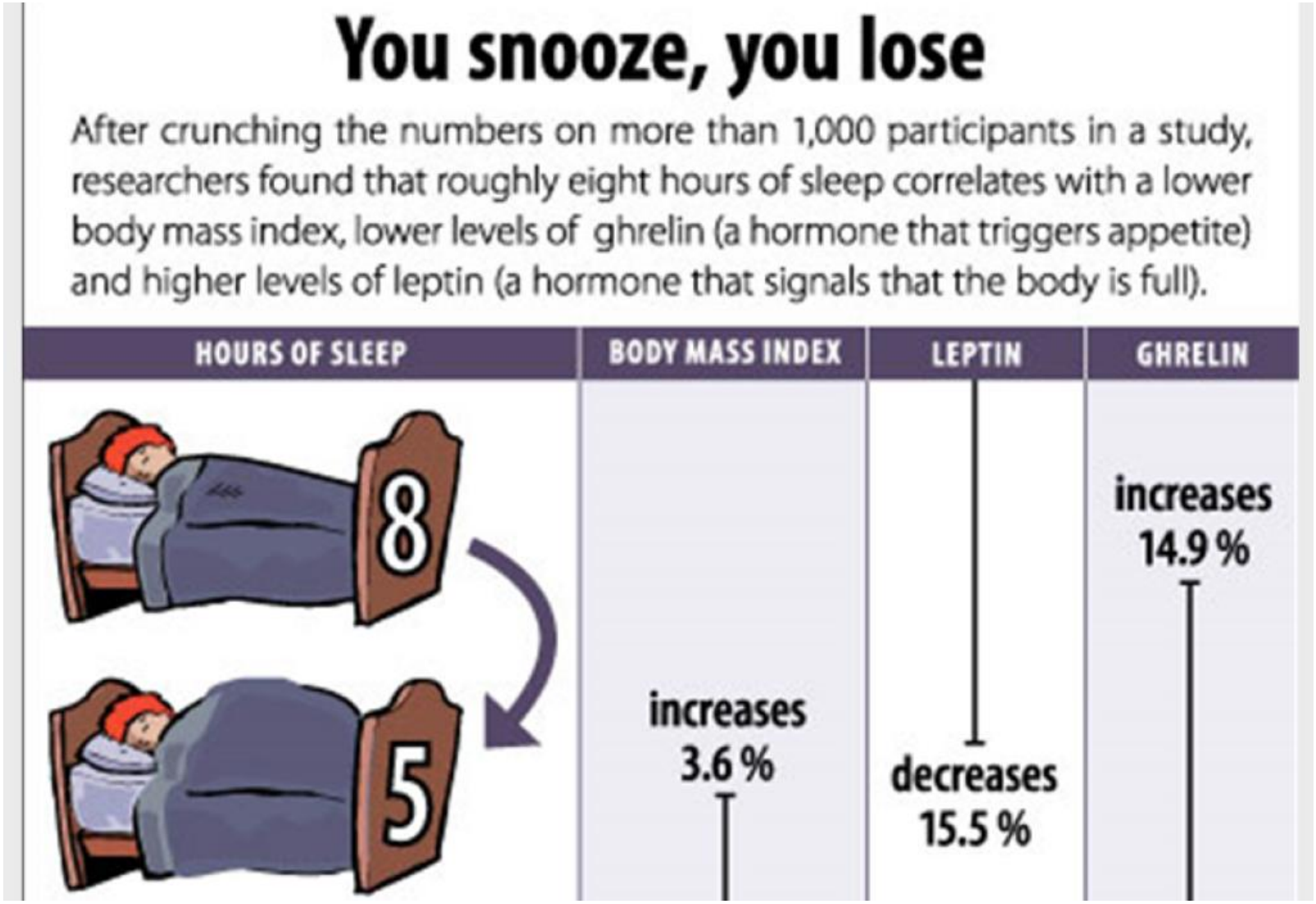
- N=12
- **Baseline microbiota showed**
  - ↑ **Firmicutes**
  - ↓ **Bacteroides**
- Assigned to low-fat or low-carb diet x 1 yr
- Irrespective of diet type as weight reduced
  - ↓ Firmicutes
  - ↑ Bacteroides
- Change in microbiota started as early as
  - 2% weight loss on low-carb diet
  - 6% weight loss on low-fat diet

Ley, Turnbaugh, Klein, and Gordon. Nature 2006; Dec 28; 444:21:1022-1023

Slide Adapted from Sicat J. Pathophysiology – Brain, Gut, and Adipocyte Hormones in Energy Regulation. Review Course ABOM. OMA. September 2018

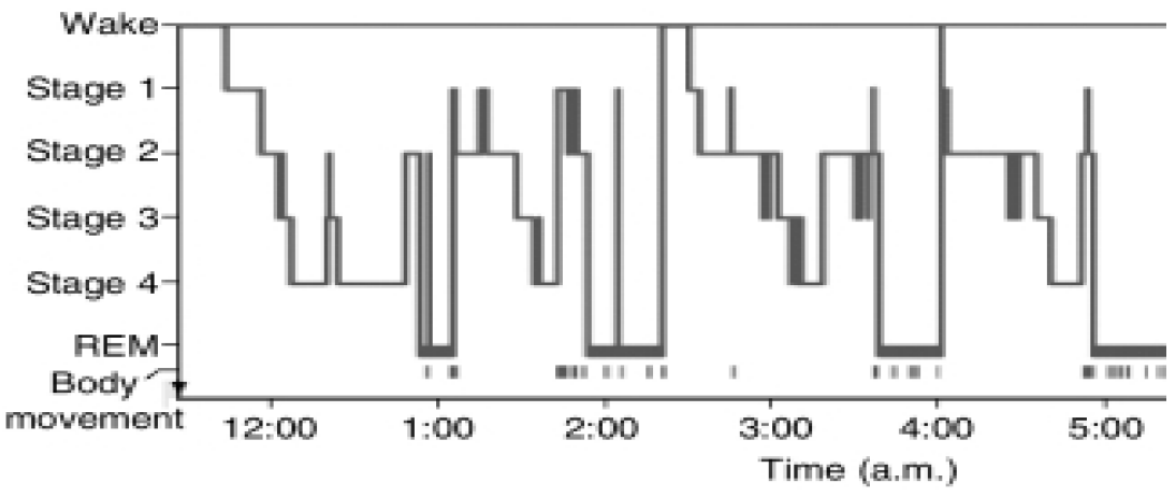
You snooze, you lose

After crunching the numbers on more than 1,000 participants in a study, researchers found that roughly eight hours of sleep correlates with a lower body mass index, lower levels of ghrelin (a hormone that triggers appetite) and higher levels of leptin (a hormone that signals that the body is full).

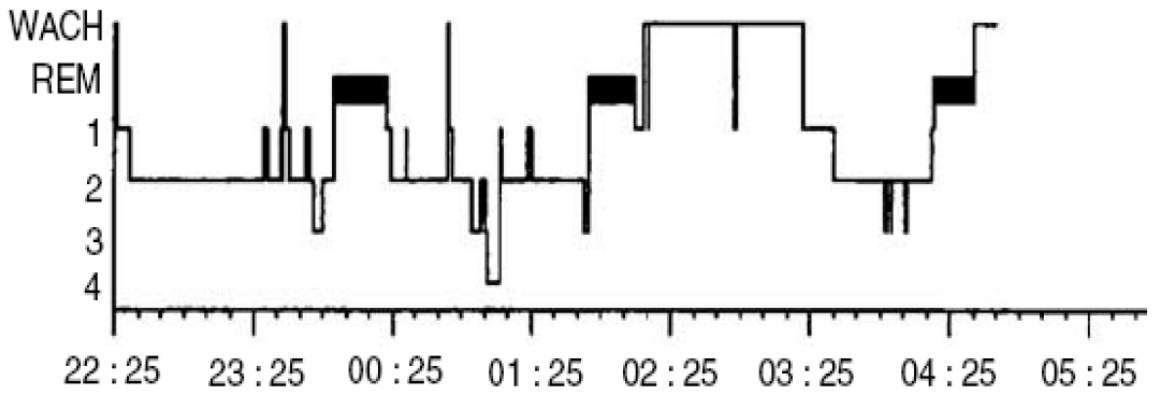


Mignot, Emmanuel, et al. Stanford.edu/med-sleep-1208.html, Dec 2004.

Environmental Factors



NORMAL SLEEP PROFILE



SLEEP APNEA PROFILE:

- Loss of Deep Sleep = ↓ stages 3 and 4
- Increased % Light Sleep↑ stages 1 and 2

Slide Adapted from Sicat J. Pathophysiology – Brain, Gut, and Adipocyte Hormones in Energy Regulation. Review Course ABOM. OMA. September 2018

Circadian Rhythm Disruption

- Circadian disruption negatively disrupt hormones and metabolism
  - Compared to day shift, night shift works have significantly:
    - Lower melatonin levels
    - Higher post-prandial glucose, insulin, and triglyceride levels
    - Blunted post-meal ghrelin suppression
  - Forced circadian misalignment studies
    - Leptin reduced
    - Glucose and insulin increased
    - Cortisol rhythm was reversed
    - Mean arterial pressure increased
    - <5.6 hrs sleep/day caused reduction in metabolic rate

Slide Adapted from Sicat J. Pathophysiology – Brain, Gut, and Adipocyte Hormones in Energy Regulation. Review Course ABOM. OMA. September 2018

Medications that may Contribute to Obesity

- Antipsychotics (ej, Clozapine, Risperdal, Quetiapine)
- Antidepressants (ej, TCAs, SSRIs)
- Mood Stabilizers (ej, Carbamazepine, Gabapentin)
- Beta-Blockers (ej, atenolol, metoprolol)
- Glucocorticoids
- Some hypoglycemic agents (insulin, sulfonylurea, thiazolidinediones)
- Antiretrovirals
- Some contraceptives (Depo-provera, Estrogens)

Eating Disorders

- Binge eating disorder
- Night Eating Disorder
- Bulimia Nervosa
- Anorexia Nervosa

❖Body Dysmorphic Disorder

Treatment and Prevention

Adiposity Related Health Conditions (Peds & Adults)

Body-image Dissatisfaction, Decreased Sex-Drive, Impaired Intimacy/Sexual Relationships

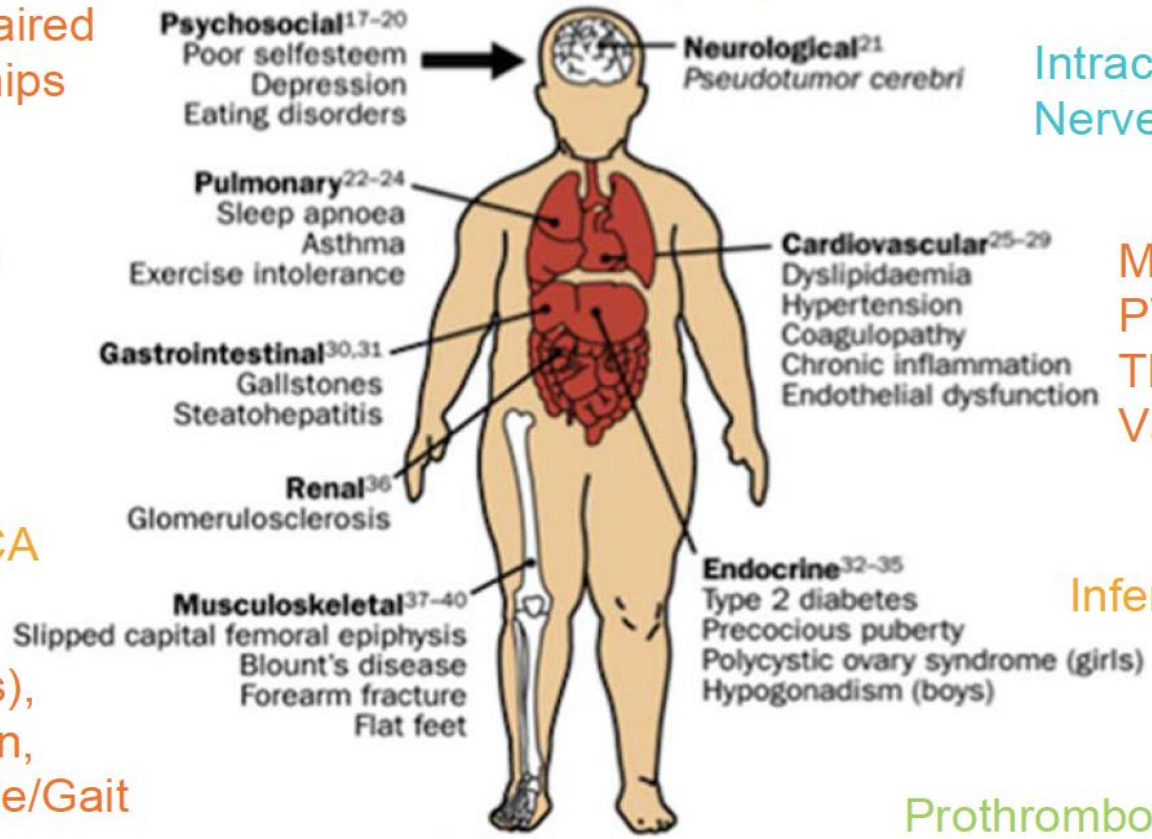
Dyspnea, OSA, Hypoventilation Syndrome, Pickwickian Syndrome

NAFLD, Hernias, GERD

Kidney stones, Renal CA

Osteoarthritis (knees,hips), Immobility, Low Back Pain, Myalgia, Impaired Balance/Gait

Oncology:
Breast, Endometrial, Esophageal, Colon, Pancreatic



Intracranial Hypertension, Stroke, Nerve Entrapment

Myocardial Infarction, Stroke, PVD,CHF, Cor Pulmonale, Thromboembolic Events, Varicose Veins

Infertility, Metabolic Syndrome

Hematology:
Prothrombotic State, Multiple Myeloma

Integument:
Stasis Pigmentation, Skin Tags, Intertrigo, Carbuncles, Cellulitis, Venous Stasis, Ulcers

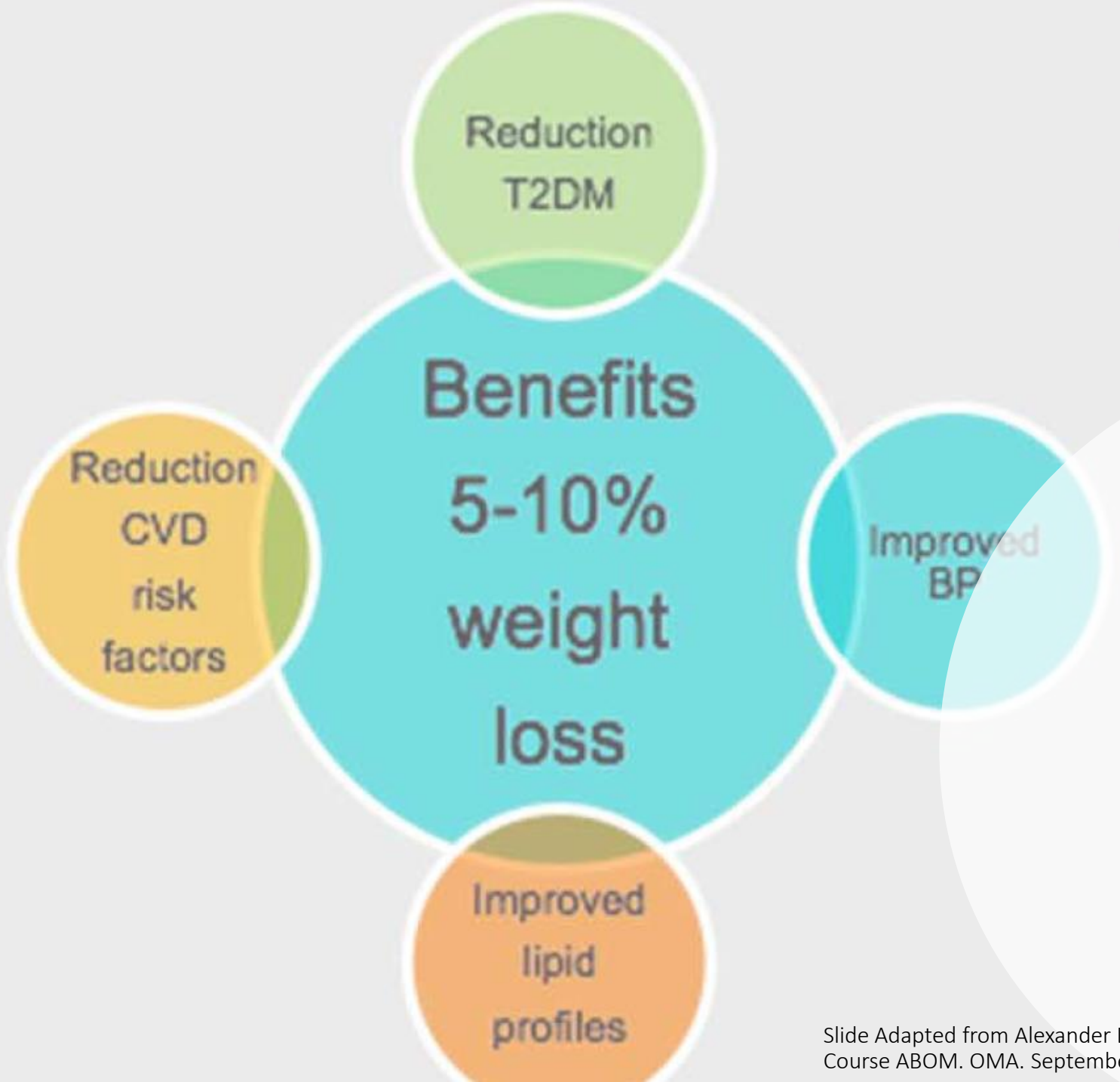
Comorbidities related to childhood obesity. (**Ebbeling et al. *Lancet* 2002**)

Obesity Medicine Association

Slide Adapted from Nicholson JR. Pharmacotherapy: "The ABCs of AODS". Review Course ABOM. OMA. September 2018

Taking an Obesity-Centric Approach…

Slide Adapted from Alexander L. Epidemiology and determinants of obesity. Review Course ABOM. OMA. September 2018



Don't forget!
IMPROVEMENT
Sleep apnea
up to 50% with
10%
weight loss

Data shows 5-10% weight loss may improve obesity-related health conditions

Slide Adapted from Alexander L. Epidemiology and determinants of obesity. Review Course ABOM. OMA. September 2018

10% Weight Loss Beneficially Improves the Following Conditions

- Osteoarthritis
- Rheumatoid Arthritis
- Neural Tube Defects
- Cancers of Breast, Esophagus, Stomach, Colon, Endometrium & Kidney
- CAD
- Carpal Tunnel Syndrome
- Chronic Venous Insufficiency
- Daytime Somnolence
- DVT
- DMII
- Kidney Disease
- Gall Bladder Disease
- Gout
- Heart Disorders
- HTN
- Impaired Immunity
- Impaired Respiratory Function
- Infection Following Wounds
- Infertility
- Liver Disease
- Low Back Pain
- OBGYN Complications
- Pain
- Pancreatitis
- Sleep Apnea
- Stroke
- Surgical Complications
- Urinary Stress Incontinence
- And More….

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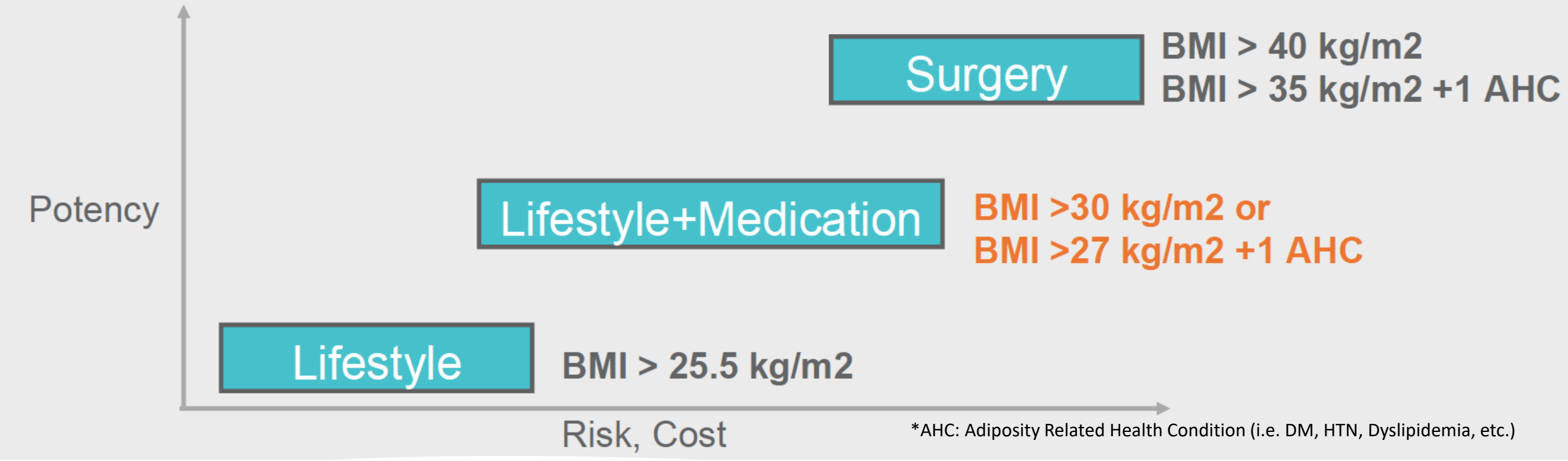
Prevention of Weight gain

- Definitions:
  - Most common is lost of 10% with maintaining this for 1 year
  - NHLBI: 10% loss, <3 kg weight regain at 2 years, sustained waist reduction of 1.6 in.
  - National Weight Control Registry
    - 30 lb. loss for at least 1 year
  - Maintaining body fat mass within +5%

Slide Adapted from Doniparthi K. Obesity Treatment Strategies. Review Course ABOM. OMA. September 2018



Treatment Paradigm

- Lifestyle: Includes nutrition, exercise, behavioral programs
- Lifestyle + Medication: May include lifestyle, VLCDs with supplements, and weight-loss medications
- Surgery: Gastric Banding<Gastric sleeve<Gastric Bypass

Slide Adapted from Nicholson J. Pharmacotherapy: The ABCs of AODS. Review Course ABOM. OMA. September 2018

Lifestyle/Risk Modifications

- Nutrition
- Physical Activity
- Lifestyle change programs

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.

Obesity Algorithm®. © 2019 Obesity Medicine Association

Nutrition: Taking a Diet History

- Is there a general understanding of the basics of nutrition?
- Food quality: junk foods, SSBs (soda, juice), lack of vegetables
- Patterns: defined mealtimes and snacks versus grazing
- Triggers: places, activities, emotions (comfort, stress, boredom, anger)
- Reasons for eating out: convenience, work, leisure, enjoyment
- Household factors:
- Access to healthy/unhealthy food in house
- Influence of other household members on eating (i.e who prepares the food?)
- Lack of meal planning
- Is there a designated eating area or is eating done in front of TV or computer

Slide Adapted from WestmanEC. Assessment and Evaluation. Review Course ABOM. OMA. September 2018

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, whole grains
- 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.

Obesity Medicine

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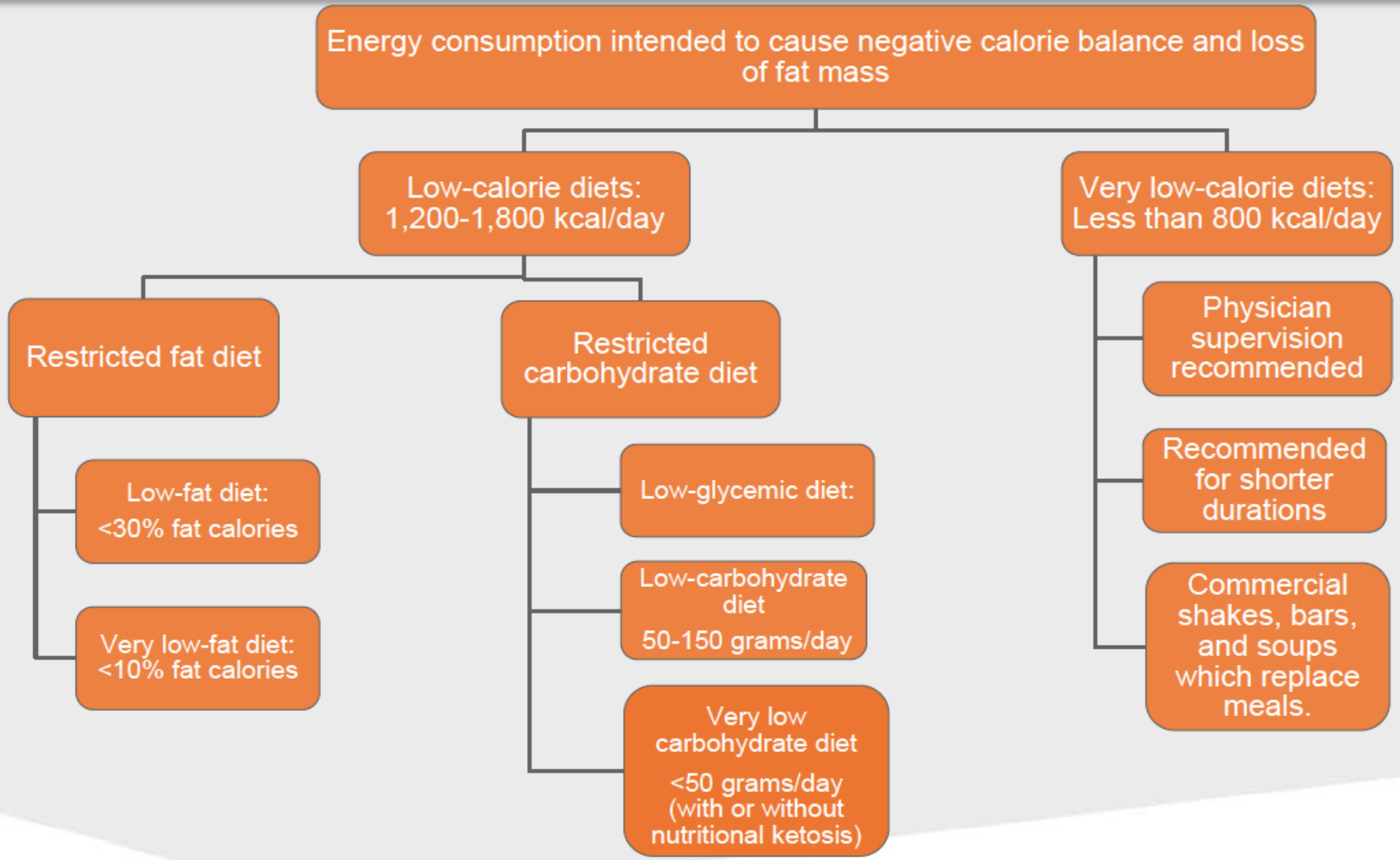
Nutrition Therapy for Obesity



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Dietary Patterns

Includes many dietary patterns but must be calorically restricted to effectively treat obesity. Weight loss and metabolic effects vary.

- Mediterranean diet
- Therapeutic lifestyle diet
- DASH (Dietary Approaches to Stop Hypertension)
- Ketogenic (Atkins) diet
- Ornish diet
- Paleo diet
- Vegetarian diet
- Intermittent fasting
- Commercial diet programs

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Diets and Health Benefits Summary

- Low Carb: ↓ trig, ↑ HDL
- Low Fat: ↓ tot. cholesterol and ↓ LDL (???)
- Mediterranean: ↓ CV mortality and ↓ DM 2
- Vegetarian / Vegan: ↓ LDL, ↓ CV mortality and ↓ DM II

Slide Adapted from Lazarus E. Nutrition. Review Course ABOM. OMA. September 2018

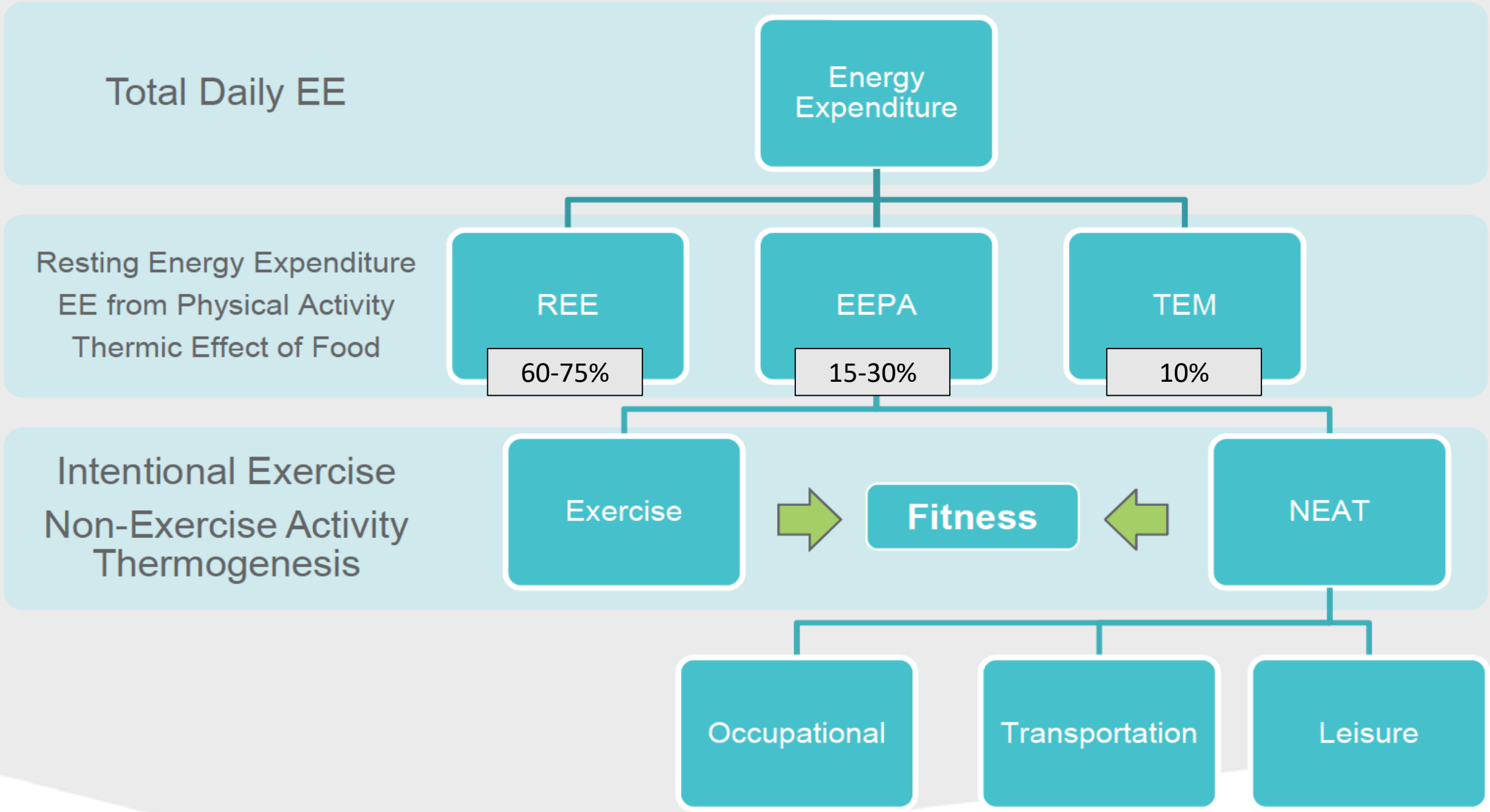
Diets and Health Benefits Summary

- DASH:↓ blood pressure
- Meal replacement programs: ↓ weight
- VLCD: Most aggressive dietary strategy, especially if done with meal replacement. Conflicting evidence regarding effectiveness.
- High protein, low GI: maintaining weight loss
- Multi-component treatment is key

Slide Adapted from Lazarus E. Nutrition. Review Course ABOM. OMA. September 2018

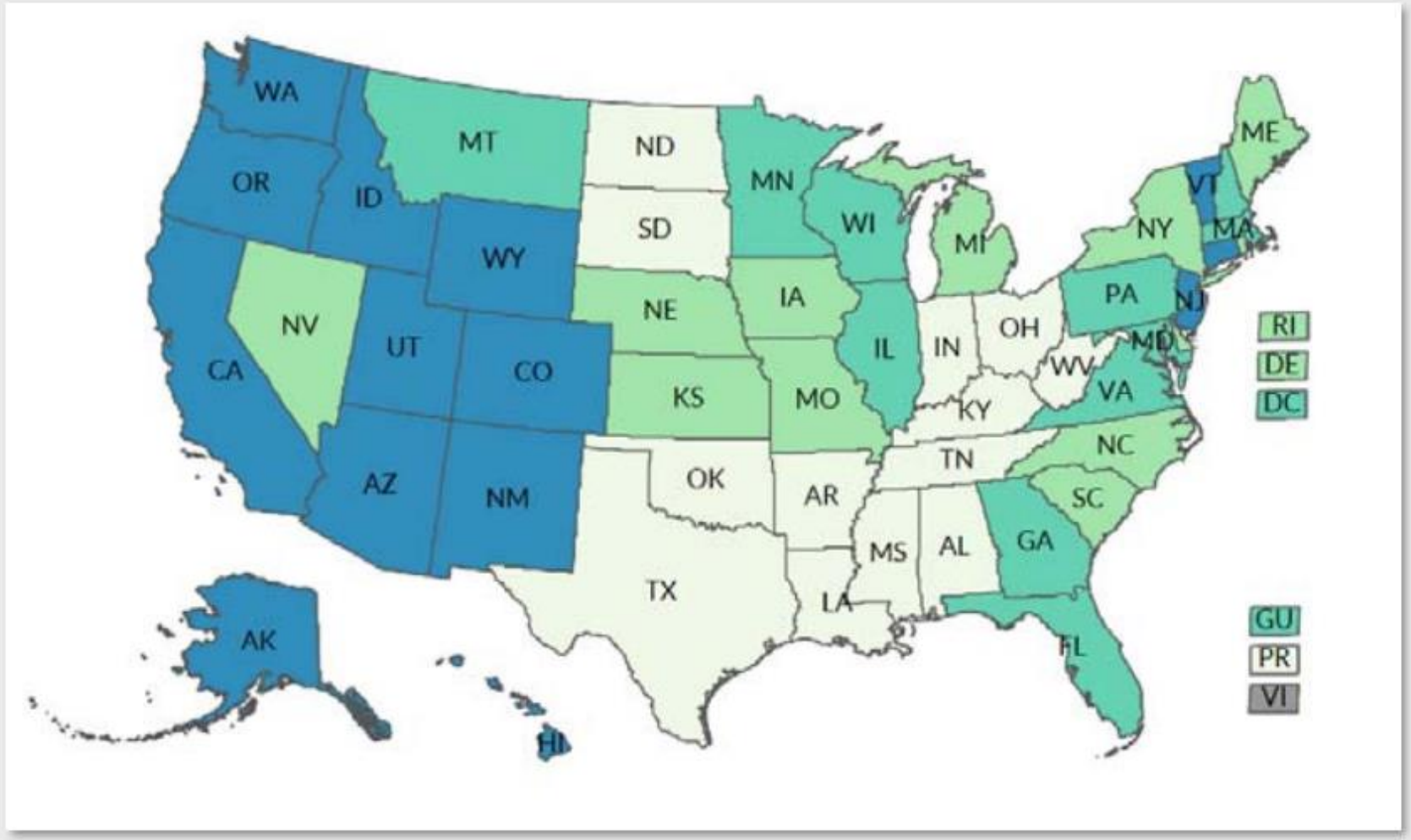
Lifestyle/Risk modifications

- Nutrition
- Physical Activity
- Behavioral Therapy

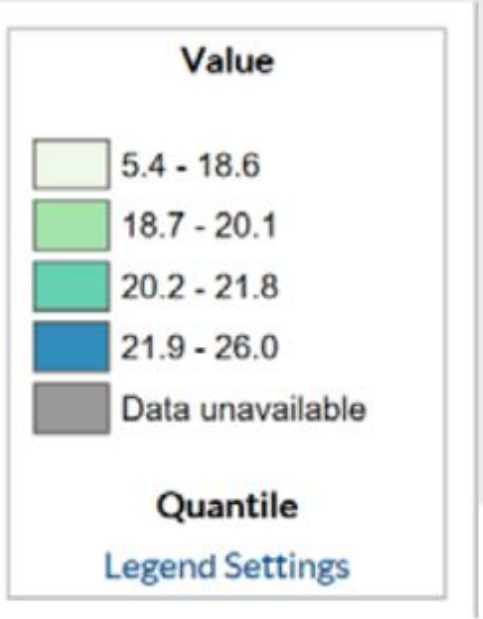


Slide from Bade Horn D. The new US physical activity guidelines (webinar). July 2, 2019.

% of US Adults Meeting Guidelines for PA in 2017



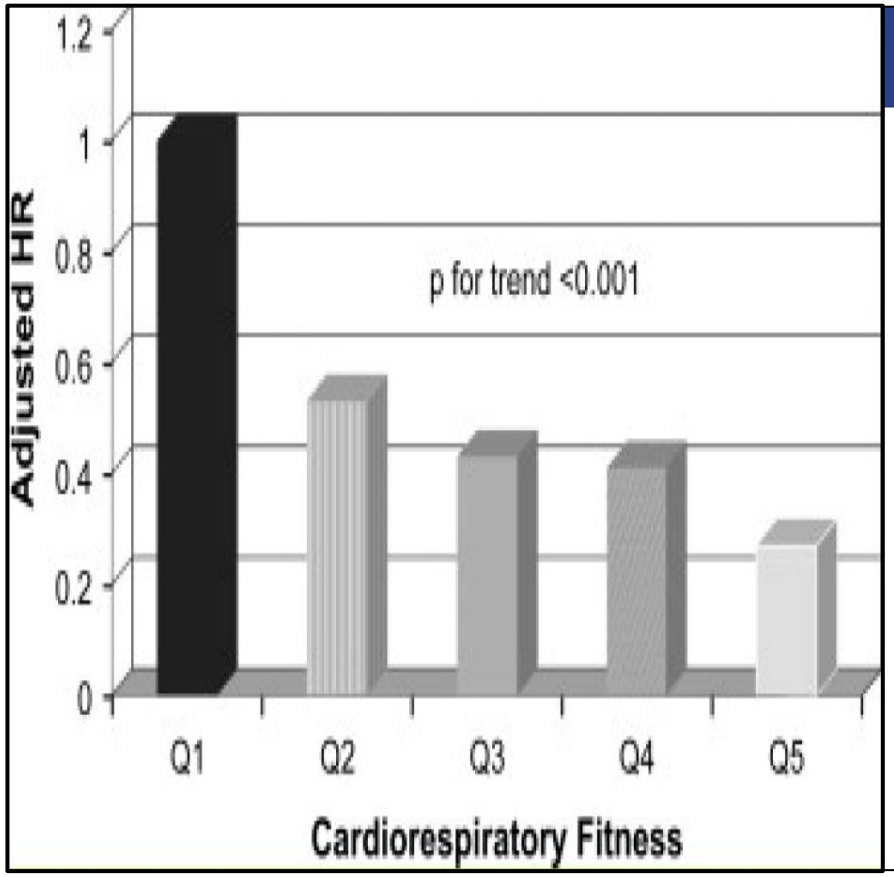
1 in 5



CDC BRFSS Telephone Survey Data. 2017. Accessed 6/2019.

Slide from Bade Horn D. The new US physical activity guidelines (webinar). July 2, 2019.

Why is Physical Activity important?



Physical Activity Saves Lives and Protects Health

Getting enough physical activity could prevent **1 in 10 premature deaths**

It could also prevent:

1 in 8

cases of breast cancer

1 in 8

cases of colorectal cancer

1 in 12

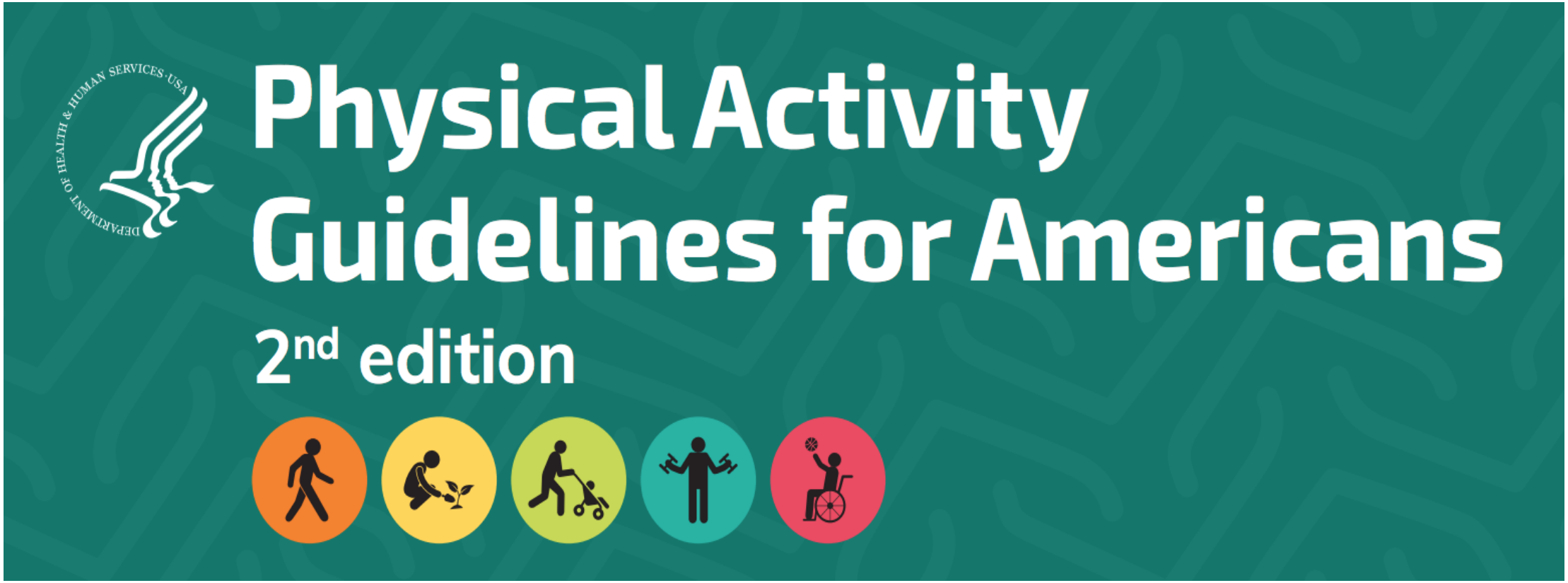
cases of diabetes

1 in 15

cases of heart disease

Sui X. JAMA. 2007.

https://www.cdc.gov/physicalactivity/about-physical-activity/why-it-matters.html



U.S. Department of Health and Human Services

Benefits of Physical Activity for Adults and Older Adults

- Lower risk of all-cause mortality
- Lower risk of cardiovascular disease mortality
- Lower risk of cardiovascular disease (including heart disease and stroke)
- Lower risk of hypertension
- Lower risk of type 2 diabetes
- Lower risk of adverse blood lipid profile
- Lower risk of cancers of the bladder,* breast, colon, endometrium,* esophagus,* kidney,* lung,* and stomach*
- Improved cognition*
- Reduced risk of dementia (including Alzheimer's disease)*
- Improved quality of life
- Reduced anxiety
- Reduced risk of depression
- Improved sleep
- Slowed or reduced weight gain
- Weight loss, particularly when combined with reduced calorie intake
- Prevention of weight regain following initial weight loss
- Improved bone health
- Improved physical function
- Lower risk of falls (older adults)
- Lower risk of fall-related injuries (older adults)*

*New health benefit

Physical Activity Guidelines for Americans
2nd edition

Key Guidelines for Preschool-Aged Children

- Preschool-aged children (ages 3 through 5 years) should be physically active throughout the day to enhance growth and development.
- Adult caregivers of preschool-aged children should encourage active play that includes a variety of activity types.

Key Guidelines for Children and Adolescents

- It is important to provide young people opportunities and encouragement to participate in physical activities that are appropriate for their age, that are enjoyable, and that offer variety.
- Children and adolescents ages 6 through 17 years should do 60 minutes (1 hour) or more of moderate-to-vigorous physical activity daily:
  - **Aerobic:** Most of the 60 minutes or more per day should be either moderate- or vigorous-intensity aerobic physical activity and should include vigorous-intensity physical activity on at least 3 days a week.
  - **Muscle-strengthening:** As part of their 60 minutes or more of daily physical activity, children and adolescents should include muscle-strengthening physical activity on at least 3 days a week.
  - **Bone-strengthening:** As part of their 60 minutes or more of daily physical activity, children and adolescents should include bone-strengthening physical activity on at least 3 days a week.

Physical Activity Guidelines for Americans
2nd edition

Key Guidelines for Adults

- Adults should move more and sit less throughout the day. Some physical activity is better than none. Adults who sit less and do any amount of moderate-to-vigorous physical activity gain some health benefits.
- For substantial health benefits, adults should do at least 150 minutes (2 hours and 30 minutes) to 300 minutes (5 hours) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) to 150 minutes (2 hours and 30 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. Preferably, aerobic activity should be spread throughout the week.
- Additional health benefits are gained by engaging in physical activity beyond the equivalent of 300 minutes (5 hours) of moderate-intensity physical activity a week.
- Adults should also do muscle-strengthening activities of moderate or greater intensity and that involve all major muscle groups on 2 or more days a week, as these activities provide additional health benefits.

Physical Activity Guidelines for Americans
2nd edition

Weight Management

Physical activity and caloric intake both must be considered when trying to control body weight. Because of its role in energy balance, physical activity is a critical factor in determining whether a person can maintain a healthy body weight, lose excess body weight, or maintain successful weight loss.

Strong scientific evidence shows that physical activity helps people maintain a stable weight over time and can reduce the risk of excessive weight gain and the incidence of obesity. People vary a great deal in how much physical activity they need to achieve and maintain a healthy weight. Some need more physical activity than

People who want to lose a substantial amount of weight (more than 5 percent of body weight) and people who are trying to keep a significant amount of weight off once it has been lost may need to do more than 300 minutes of moderate-intensity activity a week to meet weight-control goals. Muscle-strengthening activities can also help maintain lean body mass during weight loss. Combining both caloric restriction and physical activity tend to be most beneficial for weight loss rather than just caloric restriction or just physical activity.

normal weight. However, there are specific exceptions. Compared to women with normal weight, women with overweight or obesity see a greater risk reduction for developing endometrial cancer and a greater risk reduction of breast cancer-specific mortality as a result of being more physically active.

Regular physical activity also helps control body weight or reduce body fat in children and adolescents ages 3 through 17 years. Throughout childhood and adolescence, higher levels of physical activity are associated with smaller increases in body weight and adiposity.

Maintaining weight loss……Effectiveness

National Weight Control Registry Data

78% eat breakfast every day

75% weigh themselves at least once a week

62% watch less than 10 hours of TV per week

90% exercise, on average, approximately 1 hour per day

Maintainers expend an avg of 2000 kcal/wk in physical activity

What do we know about SUCCESSFUL maintainers?

Wyatt HR, et al. Obes Res. 2002;10(2):78-82. Butryn ML, et al. Obesity (Silver Spring). 2007;15(12) 3091-3096. Raynor DA, et al. Obesity (Silver Spring). 2006;14(10):1816-1824. Phelan S, et al. Obesity (Silver Spring). 2006;14(4):710-716
Slide from Bade Horn D. The new US physical activity guidelines (webinar). July 2, 2019.

Prescription tailoring for children

For Prevention of Weight Gain	For Structured Weight Management
• Limit TV & screen time to max of 2 hour/day	• Reduction of TV & screen time to less than 1 hour/day
• 60-90 min of MVPA every day (unstructured play in young children)	• Planned, supervised MVPA or active play for 60 min/day
• Routine activity patterns assessed: walking to school/performing yard work	• Behavior monitoring through PA log
• Sedentary behavior assessment	• Consider exercise physiologist at stage 3

Barlow SE. Pediatrics. 2007.

Lifestyle/Risk modifications

- Nutrition
- Physical Activity
- Behavioral Therapy

Why Do People Eat Like They Do?

- Physiologic
- Environment
- Information Gap
- Reward
- Eating Disorders

Why Don’t People Engage in Routine Physical Activity?

- Physiologic
- Lack of Time
- Disinterest
- Environment

Why Do People Regain Body Weight?

- Physiologic Priority Imbalance
- Neurobiology
- Energy Expenditure
- Behavior

Behavior Therapy: Stimulus Control and Cognitive Restructuring

Stimulus Control

- Avoid eating for reasons other than hunger
- Avoid frequent snacking
- Avoid binge eating
- Utilize portion control
- Environmental removal of foods identified as especially tempting for the individual patient
- Being habitually mindful of eating stimuli may allow best chance for stimulus control

Cognitive Restructuring

- Address matters of body image
- Identify and establish a plan to counteract unhelpful or dysfunctional thinking leading to unhealthy behaviors and actions
- Emphasize rationale of aggressive yet realistic weight-loss expectations through an emphasis on weight loss as a matter of medical and mental health
- Encourage patient to:
  - Acknowledge he/she is capable of positive thoughts and behaviors
  - Replace unhelpful thoughts and behaviors with more productive ones
  - Practice behavior therapy skills between clinician encounters

Obesity Medicine

Bays HE, McCarthy W, Christensen S, Seger J, Wells S, Long J, Shah NN, Primack C. Obesity Algorithm Slides, presented by the Obesity Medicine Association. www.obesityalgorithm.org. 2019. https://obesitymedicine.org/obesity-algorithm/ (Accessed September 17, 2020).

Behavior Therapy: Goal Setting and Self-Monitoring

Goal Setting

- Patients are given step-by-step instructions to accomplish goals (i.e., nutrition and physical activity prescriptions)
- SMART
  - **S**pecific
  - **M**easurable
  - **A**ssignable
  - **R**ealistic
  - **T**ime-related
- Goals beyond body weight alone may include overall improvement in physical and mental health

Self Monitoring

- The frequency of self-monitoring is significantly related to weight loss
- Daily or weekly body weights
- Other routine self-anthropometric measurements (i.e., calipers for percent body fat, tape measure for waist circumference, myotape for muscle mass, etc.)
- Food diaries (including online services or mobile applications)
- Physical activity logs
- Pedometer/accelerometer measures
- Changes in clothing size
- Photo journaling

Obesity Algorithm®. © 2019 Obesity Medicine Association

Supporting documents in reference section

Bays HE, McCarthy W, Christensen S, Seger J, Wells S, Long J, Shah NN, Primack C. Obesity Algorithm Slides, presented by the Obesity Medicine Association. www.obesityalgorithm.org. 2019. https://obesitymedicine.org/obesity-algorithm/ (Accessed September 17, 2020).

Behavior Therapy: Behavioral Contracting and Problem Solving

Behavioral Contracting

- Tokens of reward
- Financial incentives

"Changing a habit takes 4 weeks to install, and 1 to 2 years to make permanent"

Problem Solving, Social Support, and Other Reinforcement Contingencies

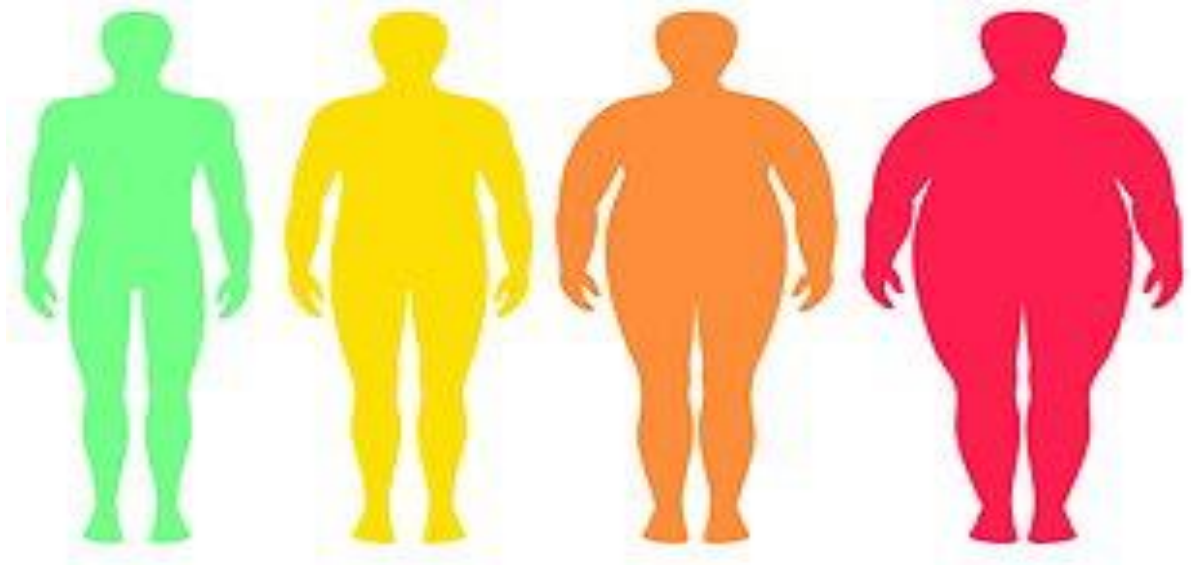
- Stress management
- Establish alternative back-up procedures to engage during times that challenge adherence to agreed upon plans (e.g., stressful periods, life changes, etc.)
- Health care team support
- Mental-health professional
- Other group or social support
- Commercial weight loss/maintenance programs
- Encourage interactions with others that may provide positive recognitions for successes

Obesity Algorithm®. © 2019 Obesity Medicine Association

Supporting documents in reference section

Bays HE, McCarthy W, Christensen S, Seger J, Wells S, Long J, Shah NN, Primack C. Obesity Algorithm Slides, presented by the Obesity Medicine Association. www.obesityalgorithm.org. 2019. https://obesitymedicine.org/obesity-algorithm/ (Accessed September 17, 2020).

Medical Therapy



FDA criteria for anti-obesity drug use

- Patients who failed to benefit adequately from lifestyle modifications and physical activity alone

AND

- Have health problems because of their weight

AND

- BMI > 30 (Obesity)

OR

- BMI >27 (Overweight) + 1 AHC
- *BMI is an insensitive indicator of CV dz

Slide Adapted from Nicholson JR. Pharmacotherapy: “The ABCs of AODs”. Review Course ABOM. OMA. September 2018

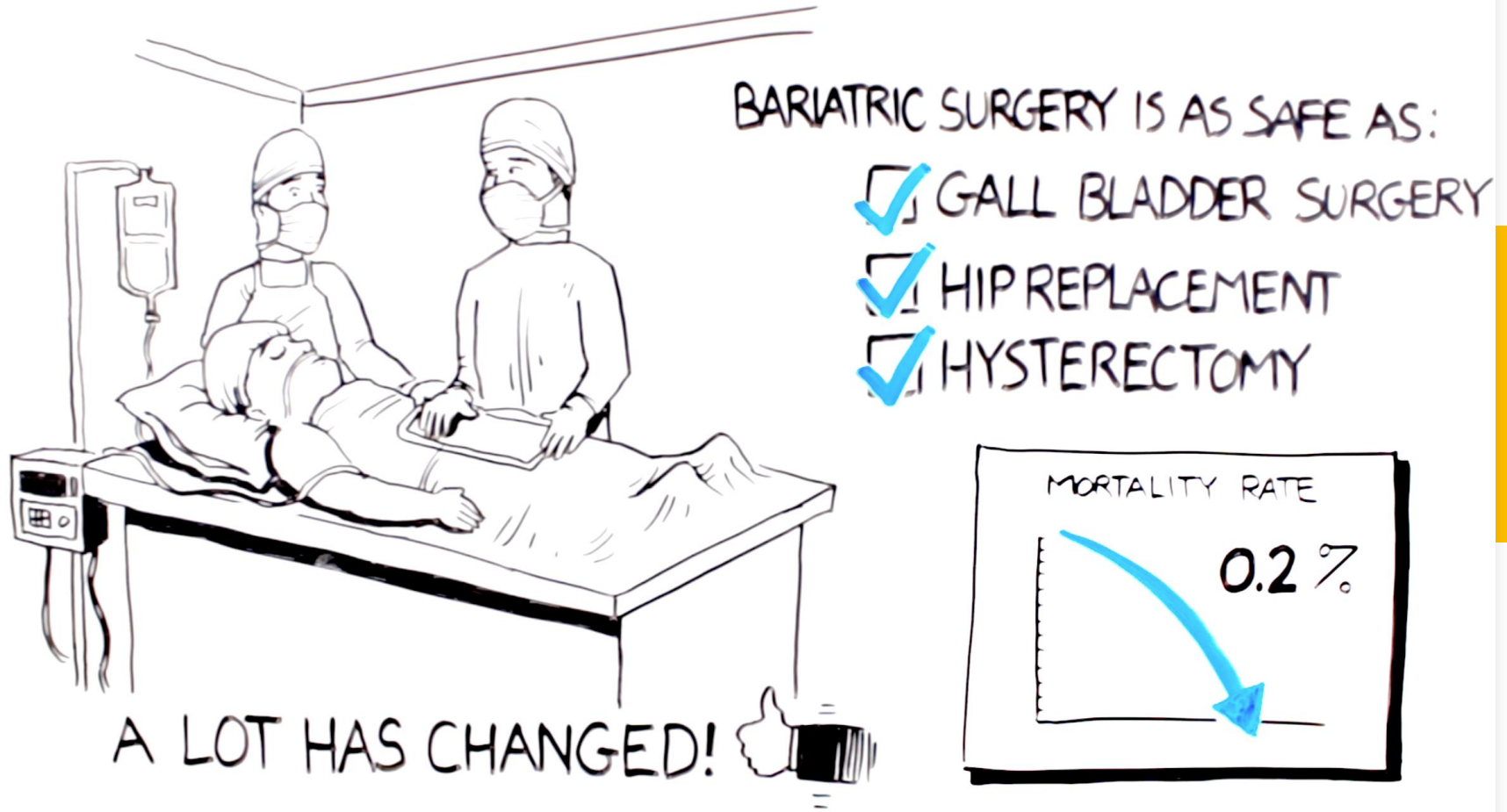
Obesity Pharmacotherapy

	Agents	Action	Approval
	Previously available		
	Phentermine*	• Sympathomimetic	• 1959
	Orlistat*	• GI lipase inhibitor	• 1997
	Recently Approved		
	Phentermine/ Topiramate ER	• Sympathomimetic/Anticonvulsant (GABA receptor modulation?)	• Approved, Summer 2012
★	Lorcaserin	• 5-HT_{2C} serotonin receptor agonist	• Approved, Summer 2012
	Naltrexone ER/ Bupropion ER	• Dopamine/noradrenaline reuptake inhibitor/Opioid receptor antagonist	• Approved, September 2014
★	Liraglutide 3 mg	• GLP-1 receptor agonist	• Approved, December 2014

Lisdexamfetamine ** only FDA approved medication for Binge Eating Disorder

US FDA. Drugs@FDA. http://www.accessdata.fda.gov/Scripts/cder/DrugsatFDA.

Slide courtesy of W. Timothy Garvey, MD

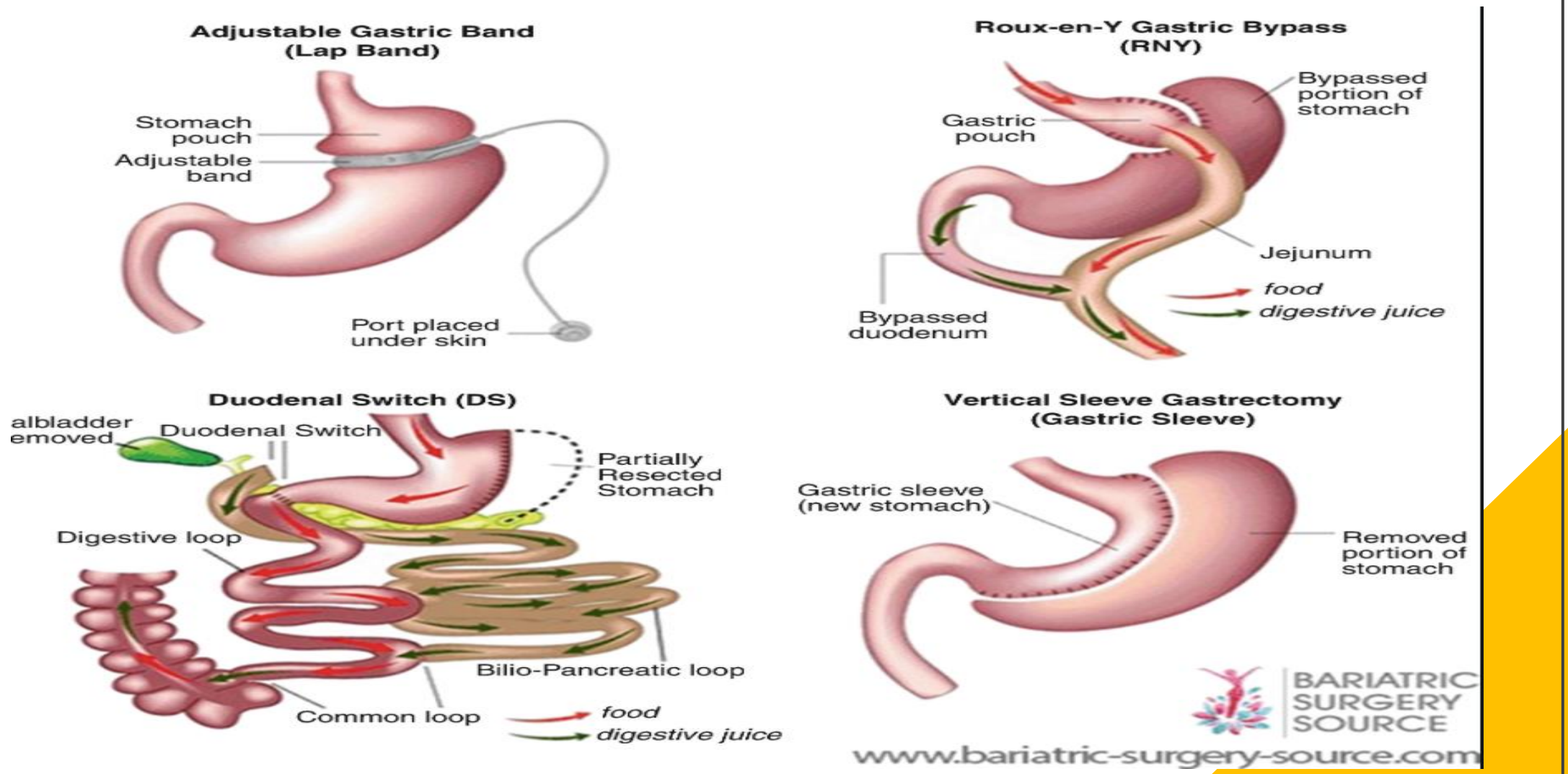


Surgical Management

Candidates for Weight Loss Surgery (WLS)

- Should have no known endocrine cause for their obesity
- Should be of sound mind to understand the risks of the surgery and the commitment necessary to be successful
- Should be able to commit to regular follow up visits as well as the diet and exercise program after surgery
- Should have already attempted medical WL treatments without success

Slide Adapted from Long J. Overview of Weight loss surgery. Review Course ABOM. OMA. September 2018


Adjustable Gastric Band
(Lap Band)
Stomach pouch
Adjustable band
Port placed under skin
Roux-en-Y Gastric Bypass
(RNY)
Bypassed portion of stomach
Gastric pouch
Jejunum
food
digestive juice
Bypassed duodenum
Duodenal Switch (DS)
albladder emoved
Duodenal Switch
Partially Resected Stomach
Digestive loop
Bilio-Pancreatic loop
Common loop
food
digestive juice
Vertical Sleeve Gastrectomy
(Gastric Sleeve)
Gastric sleeve (new stomach)
Removed portion of stomach
BARIATRIC SURGERY SOURCE
www.bariatric-surgery-source.com

N= 104 1 year post-op	Number Prior to Surgery	% Worse	% No - change	% Improved	% Resolved
Osteoarthritis	64	2	10	47	41
Hypercholesterimia	62	0	4	33	63
GERD	58	0	4	24	72
Hypertension	57	0	12	18	70
Sleep Apnea	44	2	5	19	74
Hypertriglyceridemia	43	0	14	29	57
Peripheral Edema	31	0	4	55	41
Stress Incontinence	18	6	11	39	44
Asthma	18	6	12	69	13
Diabetes	18	0	0	18	82
Average		1.6%	7.6%	35.1%	55.7%

90.8%
Improved or Resolved

Resolution of medical problems after surgery

Slide Adapted from Long J. Overview of Weight loss surgery. Review Course ABOM. OMA. September 2018

“Energy Balance is Simple”

Take Home Points

- Obesity is a chronic, multifactorial and relapsing disease that affects millions and requires lifelong treatment.
- Interplay of genetics and epigenetics predispose individuals to environmental susceptibility for obesity.
- Taking the first steps to understand this disease and treating patients affected by overweight and obesity will have a significant impact on the lives of our patients.

Any Questions?

milliette.alvarado@upr.edu