

# Medical Weight Management: Not Just Calories In vs. Calories Out

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Ogden Surgical-Medical Society Conference

May 18, 2016

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# 38 y/o male with chest pain

- 250lb. male in the ER with complaints of chest pain.
- Family HX of coronary artery disease, hyperlipidemia, obstructive sleep apnea, depression, osteoarthritis & obesity.
- Workup in ER was negative.
- Change lifestyle to eat smaller volumes at each meal and increase exercise.
- Decreased weight from 250lbs. down to 210lbs.
- Continued increase activity, implement low carb diet and weight decreased from 210lbs. down to 170.lbs

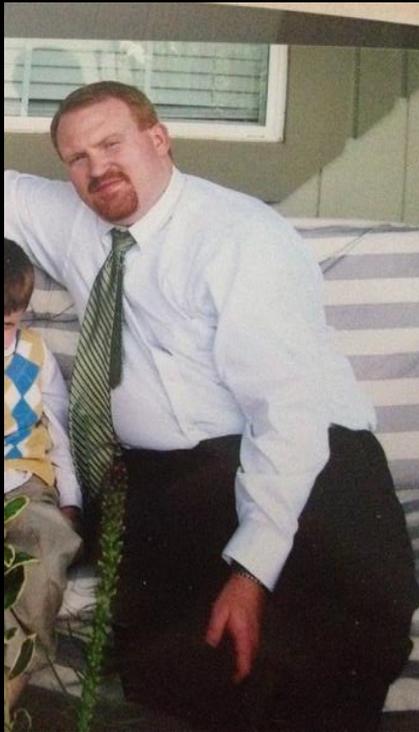


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# 38 y/o male with chest pain

Before



After



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# ASBP Definition of Obesity

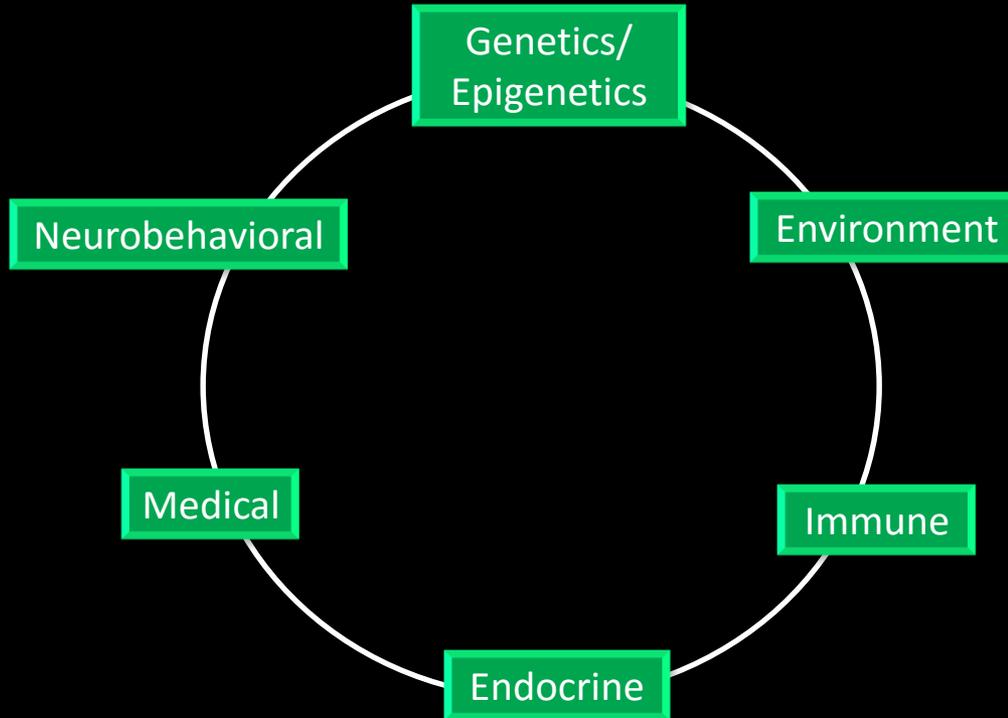
“Obesity is defined as a chronic, relapsing, multi-factorial, neurobehavioral disease, wherein an increase in body fat promotes adipose tissue dysfunction and abnormal fat mass physical forces, resulting in adverse metabolic, biomechanical, and psychosocial health consequences.”



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# Obesity as a Multifactorial Disease



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# Subsets of Patients Overweight and/or Obese

Deranged endocrine & immune responses



## Sick Fat Disease (SFD) (Adiposopathy)

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

Abnormal & 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.)



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# 3 Ways To Measure Body Fat

- Percent Body Fat
- Waist Circumference
- Body Mass Index (BMI)

70% of Americans are overweight or obese. (CDC)



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# Percent Body Fat

## Essential Fat

Women: 10-13%  
Men: 2-5%

## Athletes

Women: 14-20%  
Men: 6-13%

## Fitness

Women: 21-24%  
Men: 14-17%

## Acceptable

Women: 25-31%  
Men: 18-24%

## Obesity

Women: >32%  
Men: > 25%

### Advantages:

- More specific assessment of body fat (not muscle, etc.)
- May be a reasonable longitudinal measure in patients adhering to resistance exercise training

### Disadvantages:

- Some measures are not always accurate, not easily reproducible
- Electronic/machine body fat measures may be expensive
- Cut-off points not as validated to correlate to metabolic disease as waist circumference



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# Waist Circumference

Overweight and obesity classification:  
Waist Circumference (WC)\*

## Men Abdominal Obesity

> 40 inches  
> 102 centimeters

## Women Abdominal Obesity

> 35 inches  
> 88 centimeters

### Advantages:

- Well correlated to metabolic disease
- Direct anatomical measure of adipose tissue deposition, with an increase in WC reflective of adipose tissue dysfunction
- Low cost

### Disadvantages:

- Measurement not always reproducible
- Not clear that waist circumference is clinically superior to BMI in correlating to metabolic disease, especially at BMI > 35 kg/m<sup>2</sup>
- Racial/ethnic differences



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# Body Mass Index

Overweight and obesity classification:  
Body mass index (BMI) in kilograms per meters squared (kg/m<sup>2</sup>)\*

## Normal Weight

18.5-24.9

## Overweight

25.0-29.9

## Class I Obesity

30.0-34.9

## Class II Obesity

35.0-39.9

## Class III Obesity

> 40

### Advantages:

- Increased BMI generally correlates with metabolic and fat mass diseases in population studies
- Commonly used
- Reasonably reproducible
- Low cost
- Adequate measure for epidemiological studies
- Adequate screening metric for the most patients

### Disadvantages:

- May not correlate with metabolic and fat mass disease in an individual patient
- Does not account for muscle mass
- BMI cut-off points do not distinguish between men and women, nor ethnic and racial considerations
- Should be used as part of the clinical evaluation, and not the sole measure of obesity for all patients

\*\*Different BMI cut-off points may be more appropriate for women versus men, those of different races, and individuals\*\*



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# Which is the “Best” Measure of Obesity?

- % body fat may be useful in patients with extremes in muscle mass and thus may be a more accurate measure of body composition when assessing the efficacy of interventions directed towards change in muscle mass.
- WC provides additional information regarding adipose tissue function/dysfunction and predisposition to metabolic disease among individuals with BMI < 35kg/m<sup>2</sup>.
- BMI is a reasonable initial screening measurement for most patients.



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# Adiposopathy (Sick Fat Disease)

- Impaired Adipogenesis
- Adipocyte organelle dysfunction (endoplasmic reticulum, mitochondria, etc.)
- Increased circulating free fatty acids
- Pathogenic adipose tissue endocrine responses
- Pathogenic adipose tissue immune responses
- Pathogenic consequences to other body organs such as fatty liver, vasculopathies (endothelial dysfunction, atherosclerosis, hypercoagulation), etc.



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# Adiposopathy (Sick Fat Disease)

## Sex- specific Manifestations

### Women

- Hyperandrogenemia
- Hirsutism
- Acne
- Polycystic ovarian syndrome
- Menstrual disorders
- Infertility
- Gestational diabetes mellitus
- Preeclampsia
- Thrombosis

### Men

- Hypoandrogenemia
- Hyperestrogenemia
- Erectile dysfunction
- Low sperm count
- Infertility

## Cancer Manifestations

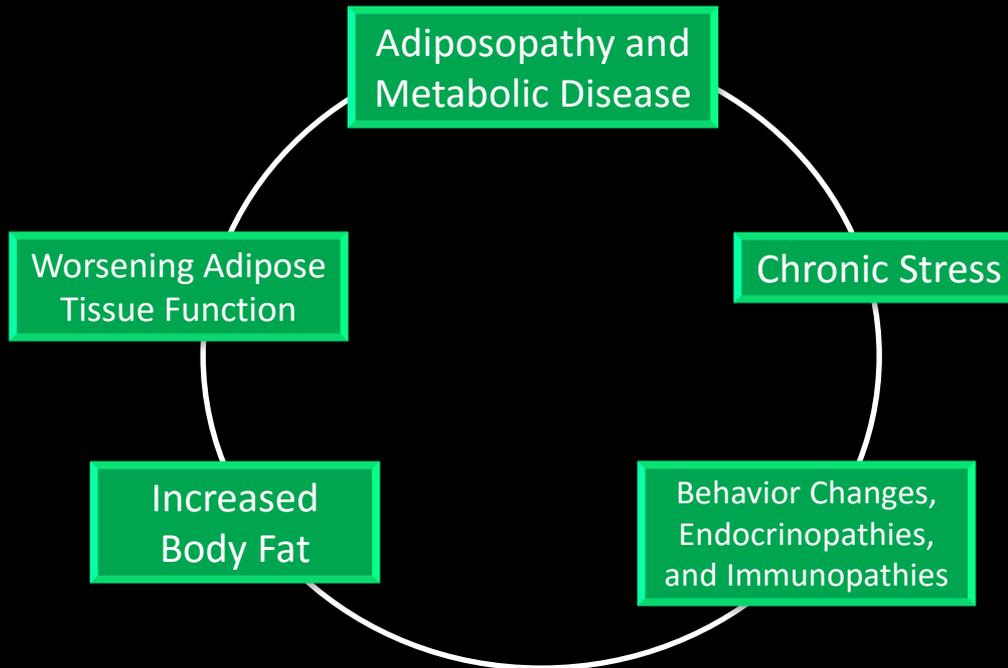
- Postmenopausal breast cancer
- Colon cancer
- Endometrial/uterine cancer
- Esophageal cancer
- Stomach cancer
- Pancreatic cancer
- Renal cell/kidney cancer
- Gallbladder cancer
- Brain cancer
- Leukemia
- Non-Hodgkin lymphoma
- Multiple myeloma
- Liver cancer
- Cervical cancer
- Ovarian cancer
- Prostate cancer
- Bladder cancer
- Thyroid cancer



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# Adiposopathy Stress Cycle



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# Individualized Diagnostic Testing

## Body Composition

- Dual-energy X-ray absorptiometry (DXA), ideally with visceral fat assessment
- Bioelectric impedance
- Near-infrared interactance
- Whole-body air displacement plethysmography (Bod Pod)
- Myotape measurements
- Caliper percent body fat measurements
- Underwater weighing
- Quantitative magnetic resonance (QMR)
- Computerized tomography
- Deuterium dilution

## Emerging Science Testing

- Leptin
- Adiponectin
- Leptin-to-adiponectin ratio
- Free fatty acids
- Immune markers
  - Tumor necrosis factor
  - Interleukin 1 and 6
- Infectious testing



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# Nutritional Therapy

Efficacy factors:

Evidence- based

Quantitative

Qualitative

Patient  
preference

Patient  
adherence

It is not simply calories in and calories out



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# Why Do People Eat Like They Do?

## Physiologic

- Hunger before meals
- Lack of satiety after meals
- Facilitate sleep
- Five senses
  - Sight of food
  - Smell of food
  - Hear talk of food
  - Taste of food
  - Feel lack of food – “empty stomach”

## Timing and Emotions

- Timing
  - It’s mealtime
  - Special occasions
  - Holidays
- Emotions
  - Celebrate happiness
  - Soothe sadness
  - Treat
    - Boredom
    - Fatigue
    - Stress

## Environment

- Others are eating
- Food is available
- Offers of free food
- Food advertisements
- Perceived obligations
  - Family gatherings
  - Business meetings

## Information Gap

- Lack of education about proper nutrition
- Challenges regarding access to nutritional information, especially when eating out
- Caloric content
- Nutritional content



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# Physical Activity

- Adiposopathy (Sick Fat Disease)
  - Assist with weight maintenance
  - Assist with weight loss
  - Improve body composition
  - Improve adiposopathic psychological disturbances
  - Possibly improve adipocyte function (“train” fat cells)
    - Improve insulin sensitivity
    - Increase mitochondrial biogenesis
    - Increase browning of fat cells
- Non-adipose Health Parameters
  - Improve metabolic health
  - Improve musculoskeletal health
  - Improve cardiovascular health
  - Improve pulmonary health
  - Improve mental health
  - Improve sexual health



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# Physical Activity

- 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



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# Physical Activity

- Transpotational/ 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



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# Why Don't People Engage in Routine Physical Activity

## Physiologic

- Musculoskeletal, neurologic, pulmonary, cardiac, and other health disorders
- Pain or soreness
- Fatigue
- Conveniences which limit the physiologic need for physical activity

## Environment

- Lack of:
  - Others engaged in physical activity
  - Safe Environment
  - Parks or other areas for leisure activity
  - Accessible gym
  - Workplace exercise equipment
- Inadequate maintenance of increased physical activity, once started
- Insufficient education on physical activity

## Disinterest

- “Exercise if boring”
- Past failures to achieve exercise goals
- Past failures in observing body changes
- Concerns of being seen:
  - In workout clothes
  - In gyms surrounded by others more fit
- Desire to avoid perspiration
  - Benefits
  - Risks
  - Techniques

## Lack of Time

- Work commitments
- Family responsibilities
- Time preferentially allotted for other entertainments with minimal energy expenditure
  - Television
  - Movies
  - Video games
  - Internet



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# Pharmacotherapy

## Examples of anti-obesity medications approved 1999 or before

- Phentermine
- Diethylpropion
- Phendimetrazine
- Benzphetamine
- Orlistat

## Examples of anti-obesity medications approved 2012 and beyond

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



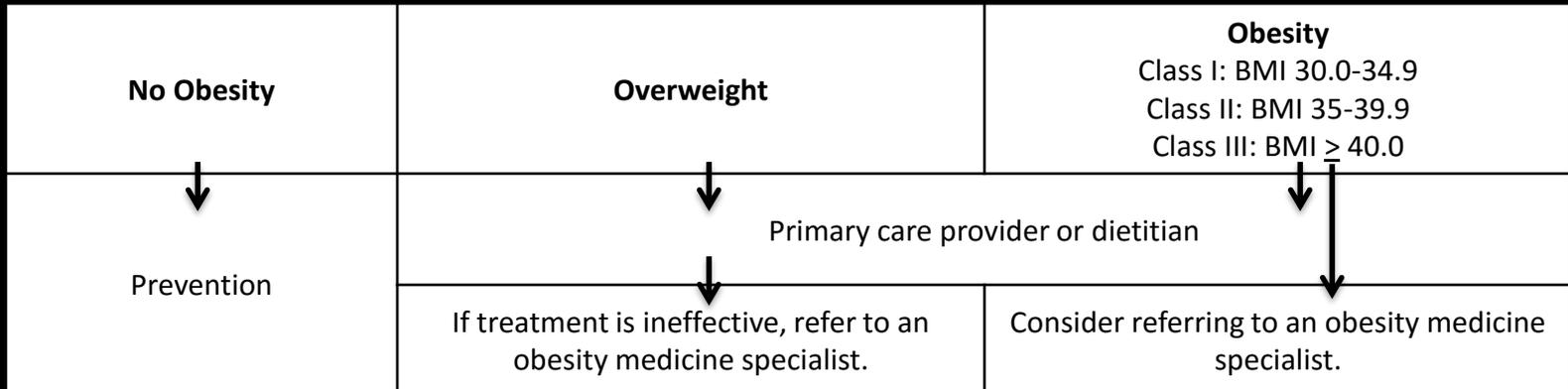
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# Assess for the Presence of Obesity, Adiposopathy, Fat Mass Disease

Obesity may be assessed using several criteria (thresholds vary based on ethnicity):

Body Mass Index (BMI)	18.5-24.9	25.0-29.9	≥30
Percent Body Fat	Male: <25% Female: <32%		Male: >25% Female: >32%
Waist Circumference	Male: <40 in. Female: <35 in.		Male: >40 in. Female: >35 in.
Edmonton Obesity Staging System	Stage 0, 1, 2, 3, 4		

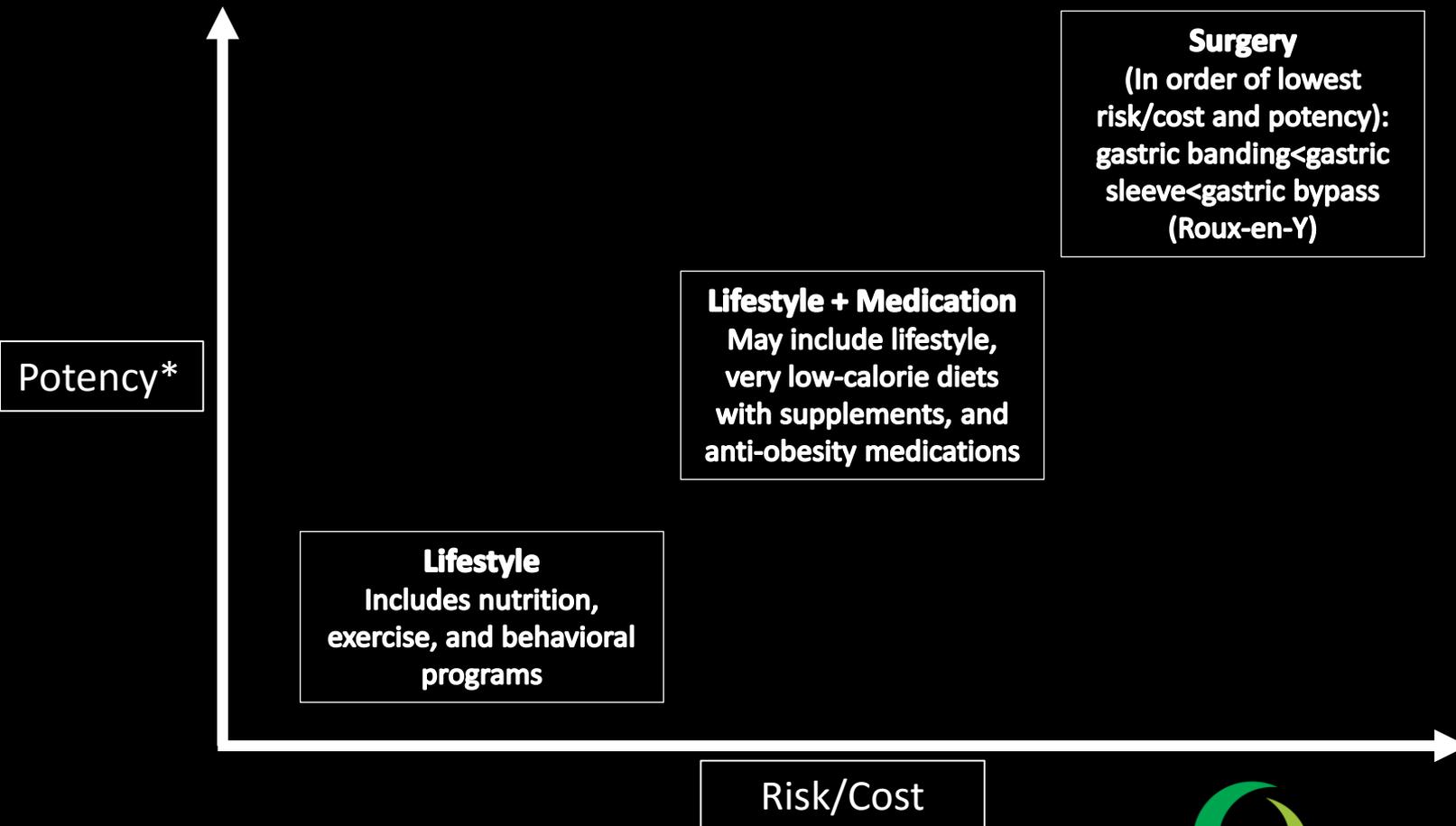


# Assess for the Presence of Obesity, Adiposopathy, Fat Mass Disease

<b>Body Mass Index</b>	<p>BMI = (weight in kg)/(height in m)<sup>2</sup>  OR  703 x (weight in pounds)/(height in inches)<sup>2</sup></p>
<b>Percent Body Fat</b>	<p>Can be calculated using bio-impedance, near infrared reactance, DEXA scan or whole body air-displacement plethysmography.</p>
<b>Waist Circumference</b>	<p>Can be measured by tape measure around the abdomen at the level of the anterior superior iliac crests, parallel to the floor. Tape should be snug against skin without compressing.</p>
<b>Edmonton Obesity Staging System</b>	<p>STAGE 0: No apparent risk factors, no physical symptoms, functional limitations, and/or impairment of well-being  STAGE 1: Presence of obesity-related subclinical risk factors, mild physical symptoms, mild psychopathology, mild functional limitations, and/or mild impairment of well-being  STAGE 2: Presence of established obesity-related chronic disease, moderate psychopathology, moderate functional limitations, and/or impairment of well-being  STAGE 3: Established end-organ damage, significant psychopathology, significant functional limitations, and/or impairment of well-being  STAGE 4: Severe (potentially end-stage) disabilities from obesity-related chronic diseases, severe disabling psychopathology, severe functional limitations, and/or severe impairment of well-being</p>

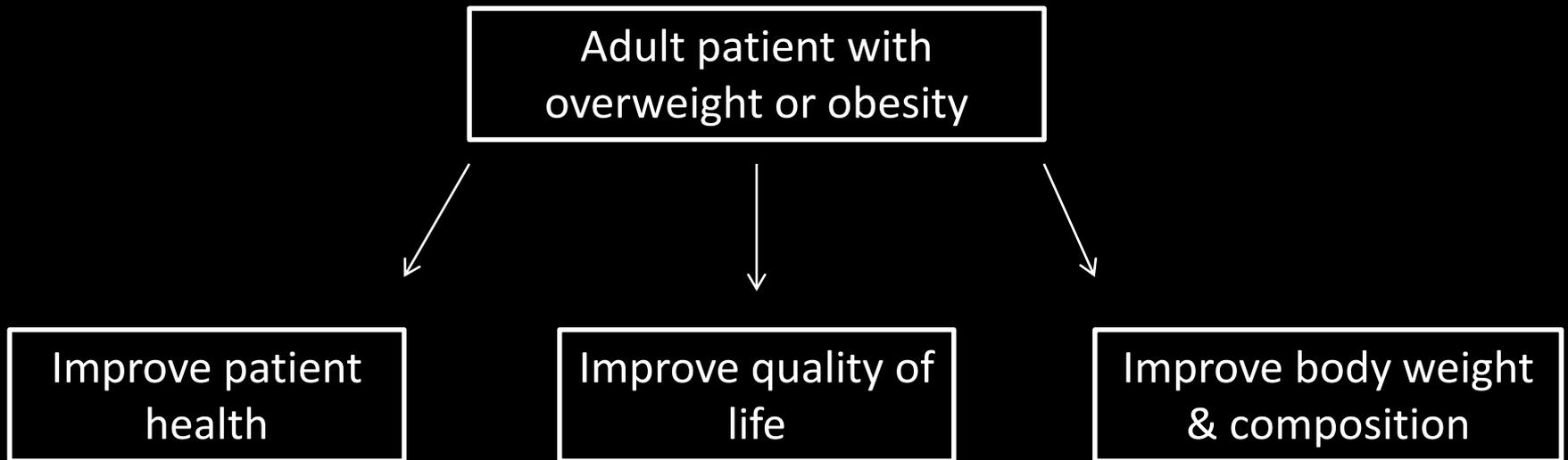
Obesity medicine specialists, certified by the American Board of Obesity Medicine, dedicate a portion or all of their practice to the treatment of obesity. They perform a medical evaluation (history, physical, laboratory, body composition) and provide medical supervision for lifestyle change (nutrition, activity, behavior change), medications, or very low-calorie diets. Obesity is a chronic medical disease and often requires lifelong treatment.

# Current Treatment Options for Obesity



Providers are at fault for some cases  
weight positive or weight negative

# Overall Management Goals



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# Comparing Cases

- 62 y/o male with complaints of fatigue, SOB, HX of bladder cancer, thyroid cancer
- Weight 404 lbs.
- BMI 53.3
- Counting calories, eating 3 meals a day and incorporating healthy snacks.
- Moderate to low physical activity
- Phentermine, Testosterone
- Current weight 265 lbs.
- Current BMI 35

- 18 y/o female with complaints of depression, anxiety, fatigue, PCOS
- Family history of obesity with mother having gastric bypass surgery
- Weight 318
- BMI 51
- Calorie counting, increasing activity, multiple medications including Phentermine, Topiramate, Wellbutrin, Orlistat, Progesterone
- Currently on Saxenda
- Current weight 350 lbs.
- BMI 56.49



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