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Special thanks to :

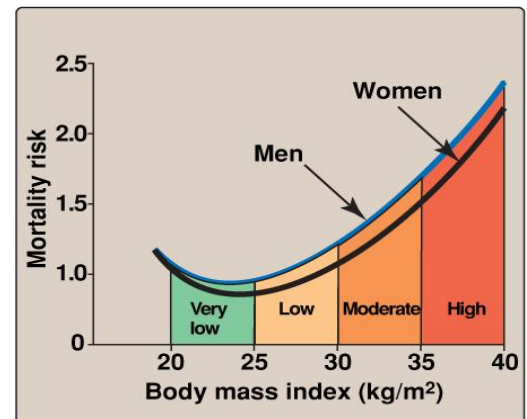
Abdullah aloqaeel

Obesity

- A disorder of body weight regulatory systems
- Causes accumulation of excess body fat
 - >20% of normal body weight

Obesity is associated with a high risk of:

- Diabetes mellitus
- Hypercholesterolemia
- High plasma triglycerides
- Hypertension
- Heart disease
- Cancer
- Gallstones, arthritis, gout
- Mortality



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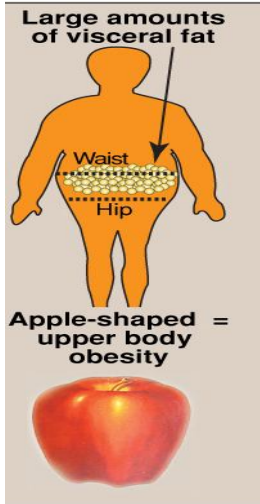
Body Mass Index (BMI):

- ✓ BMI is an indirect measure of obesity
- ✓ Correlates height, weight and amount of body fat in an individual
- ✓ High BMI is associated with increased mortality risk

	BMI	GRADE
UNDER WEIGHT	≤ 18.5	
NORMAL	18.5 – 24.9	
OVER WEIGHT	25.0 – 29.9	
OBESE	30.0 – 34.9	I
OBESE	35.0 – 39.9	II
HIGHLY OBESE	≥ 40	III

Anatomic differences in fat deposition – 2 types- :

- Health risks depend on the pattern of fat deposition

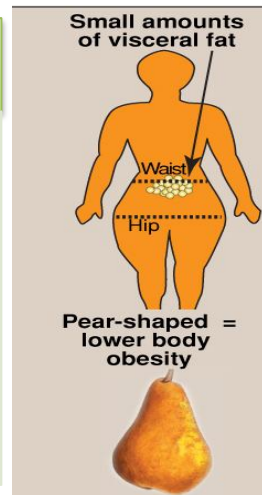


Android, "apple-shaped," or upper body obesity:

- excess body fat deposited in the central abdominal area
- Associated with risk of hypertension, insulin resistance, diabetes, dyslipidemia, and coronary heart disease
- هذا النوع خطير جدا لان الدهون في هذه المنطقة دهون نشطة تفرز هرمونات تخلق بانظمه الايض بالجسم وتسبب الامراض التي ذكرت

Gynoid, "pear-shaped," or lower body obesity

- Fat deposited around the hips or gluteal region.
- Associated risks are lower
- هذه الدهون لها نشاطيه اقل بكثير من النوع السابق



Biochemical differences in fat deposits:

Abdominal fat	Gluteal Fat
Larger cells	Smaller cells
More responsive to hormones	Less responsive to hormones
Release substances via portal vein to the liver	Release substances to circulation with no effect on the liver

Metabolic Changes in Obesity

- Adipocytes send signals that cause abnormal metabolic changes such as:
 - ✓ Dyslipidemias
 - ✓ Glucose intolerance
 - ✓ Insulin resistance

Adipocytes

- Triacylglycerols are deposited in adipocytes (fat cells)
- The cells increase in size and expand and divide
- **Fat cells, once gained, are never lost**
- In obesity adipocytes increase in **number and size**
- Reduction in weight causes adipocytes to reduce in size (**only it decrease in size it never decreased in no. IMP**)

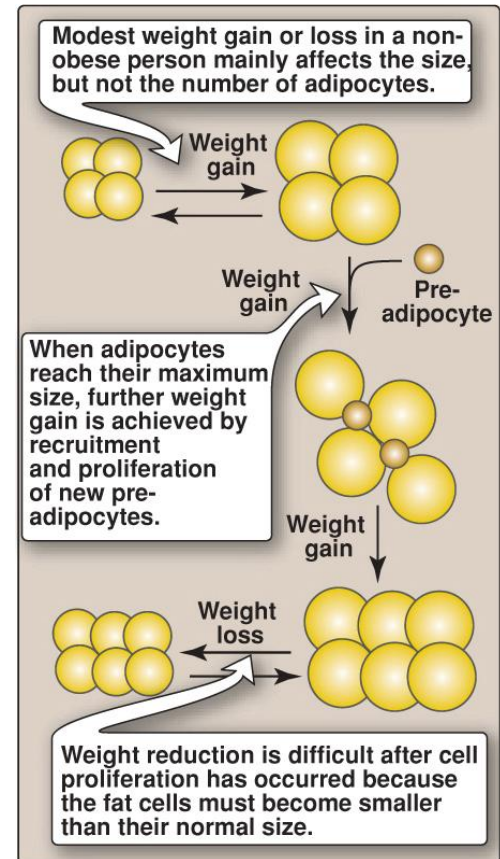
عند بداية ترسب الدهون (ديب) لا تنتج خلايا جديدة وانما تنمو
الخلايا الموجودة بالحجم فقط ' وفي مراحل السمنة المتأخرة (دب مده
(تنتج خلايا جديدة .

Factors contributing to obesity:

- **Genetic:** familial tendency
- **Environmental and behavioral**
 - ✓ **Sex:** women more susceptible
 - ✓ **Activity:** lack of physical activity
 - ✓ **Psychogenic:** emotional deprivation/depression
 - ✓ **Alcohol:** problem drinking
 - ✓ **Smoking:** cessation smoking
- **Drugs:** e.g. tricyclic derivatives

Causes of weight Gain:

- **Energy imbalance**
 - ✓ calories consumed not equal to calories used
- **Over a long period of time**
- **Due to a combination of several factors**
 - ✓ Individual behaviors
 - ✓ Social interactions
 - ✓ Environmental factors
 - ✓ Genetics
- **More in and less out = weight gain**
- **More out and less in = weight loss**
- **Hypothalamus**
 - ✓ control center for hunger and satiety
- **Endocrine disorder**
 - ✓ Hormonal imbalance



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Hormonal control:

- **Appetite is influenced by**
 - ✓ afferent neural signals, circulating hormones, and metabolites
- **These signals cause the release of hypothalamic peptides and activate efferent neural signals**
- **Adipocytes also function as endocrine cells**
- **They release many regulatory molecules:**
 - ✓ Leptin, adiponectin, resistin
- **Adiponectin and resistin, may cause insulin resistance observed in obesity**

- Leptin

- **A protein hormone produced by adipocytes**
- **Required to keep the body weight under control**
- **Signals the brain about fat store level**
- **Regulates the amount of body fat by:**
 - ✓ Controlling appetite and energy expenditure
- **Leptin secretion:**
 - ✓ Suppressed in starvation (depletion of fat stores)
 - ✓ Enhanced in well-fed state (expansion of fat stores)
- **Leptin causes overweight mice to lose weight and maintain weight loss**

- Leptin Resistance

- **Leptin increases metabolic rate and decreases appetite in humans**
- **Plasma leptin level in obese humans is usually normal for their fat mass**
- **Resistance to leptin has been found in obese humans**
- **The receptor for leptin in the hypothalamus is produced *db* gene**
- **Mutation in *db* gene causes leptin resistance in mice**
- **Leptin resistance may have some role in human obesity**
 - ✓ Dieting decreases leptin levels
 - ✓ Reducing metabolism, stimulating appetite

- Adiponectin

- **Exclusively and abundantly secreted hormone from the adipocytes**
- **Promotes the uptake and oxidation of fatty acids and glucose by muscle and liver**
- **Blocks the synthesis of fatty acids and gluconeogenesis by hepatocytes**
- **Net effect is to increase the sensitivity to insulin, and improve glucose tolerance**
- **Adiponectin levels are inversely correlated with body fat percentage and parallels with the HDL level.**
- **Low levels are seen in metabolic syndrome and diabetes mellitus**

- Other Hormones

Ghrelin:

- A peptide hormone secreted by stomach
- Stimulates appetite
- Secretion increases just before meals and drops after meals
- Increases food intake
- Decreases energy expenditure and fat catabolism
- Levels in dieters are *higher* after weight loss
- The body steps up ghrelin production in response to weight loss
- The higher the weight loss, the higher the ghrelin levels

Cholecystokinin:

- Peptides released from the gut after a meal
- satiety signals to the brain

Insulin

- Promotes metabolism

Management & Treatment options:

✓ Weight loss:

- Decreases risk factors
- Leads to:
 - ✓ Lower blood pressure
 - ✓ Decreased serum triacylglycerols
 - ✓ Lower blood glucose levels
 - ✓ Increase in HDL levels
 - ✓ Decreased mortality
 - ✓ Beneficial changes in BMR
 - ✓ Decreased energy requirement
- Slow weight loss is more stable

✓ Physical activity

- ✓ combined with healthy diet decreases level of obesity Reduces risk for heart disease and diabetes

✓ Dieting

- Use of calorie-restricted diet
- Restriction of energy intake

✓ Drugs & Surgery :

1-Sibutramine	<ul style="list-style-type: none"> • An appetite suppressant • Inhibits the reuptake of both serotonin and norepinephrine
2-Orlistat	<ul style="list-style-type: none"> • A pancreatic and gastric lipase inhibitor • Decreases the breakdown of dietary fat
Surgery	<ul style="list-style-type: none"> • Surgical procedures are designed to reduce food consumption in patients with BMI >40 • Used when other treatment options fail