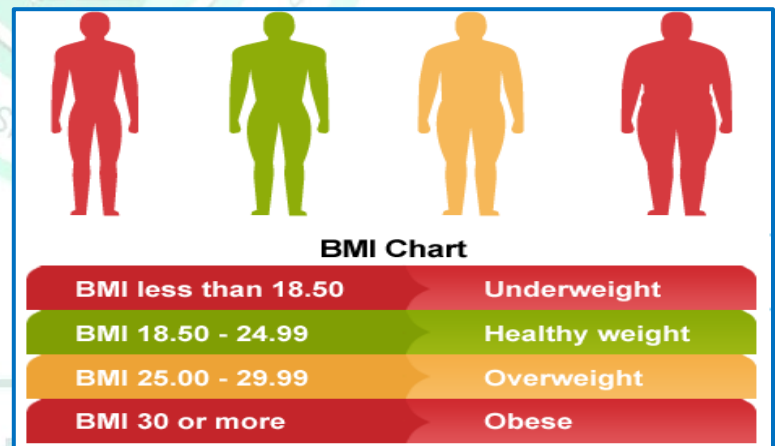# Obesity

Obesity is defined as an abnormal or excessive fat accumulation that presents a risk to the health. The main cause of weight gain and obesity is the imbalance between the amount of calories you take in and the calories you burn.

Measuring Obesity:

When calorie intake exceeds energy expenditure leads to excess accumulation of body fat. There are different methods to measure body fat: (a) Basal adiposity index (BAI), (b) Waist to hip ratio, or (c) Body mass index (D) Skin fold thickness

Body Mass Index (BMI):

It is one way of measuring whether a person's weight or body fat is higher than what is considered a healthy weight for a given height. This is measured by: calculating a person's weight in kilograms, then dividing that number by the person's height in meters squared (kg/m2). If the resulting ratio is high, then it can be an indicator of high body fat.

BMI Chart

BMI less than 18.50	Underweight
BMI 18.50 - 24.99	Healthy weight
BMI 25.00 - 29.99	Overweight
BMI 30 or more	Obese

Weight status	Body Mass Index (BMI)
Underweight	Less than 18.5
Normal (healthy weight) 18.5-24.9	18.5-24.9
Overweight	25-29.9

Obese Class I (Moderately obese)	30-34.9
Obese Class II (Severely obese)	35-39.9
Obese Class III (Very severely obese)	40 and above

Obesity is associated with a high risk of:

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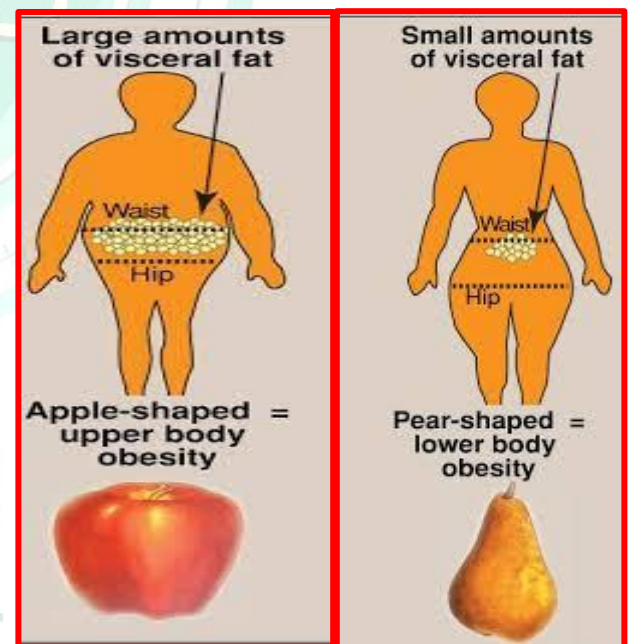- Hypertension
- Cancer
- Mortality

Anatomical Difference in Fat Deposition:

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

• Fat deposited around the hips or gluteal region

• Associated risks are lower

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 (CHD) .

Large amounts of visceral fat — Waist — Hip — Apple-shaped = upper body obesity

Small amounts of visceral fat — Waist — Hip — Pear-shaped = lower body obesity

Adipocytes and Metabolic Change in Obesity

Adipocytes **send signals that cause abnormal metabolic changes** such as:

1. Dyslipidemia : ↑ triglycerides and LDL + ↓ HDL level.

2. Glucose intolerance

3. Insulin resistance: High Level Of TAG Induce Inflammation that triggers Release Of Specific Adibokines.

Triacylglycerols are deposited in adipocytes (fat cells)
=> The cells increase in size, expand and divide
• Fat cells, once gained, **ARE NEVER LOST**
• In obesity: **adipocytes increase in number and size**
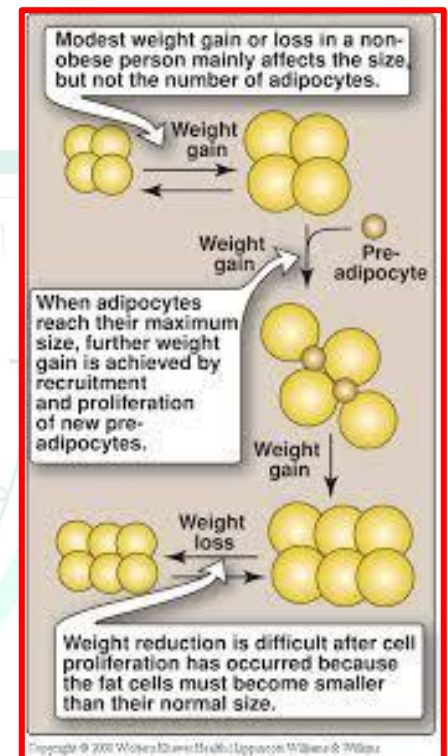• Reduction in weight causes adipocytes to reduce in size

Factors Contributing to obesity:
1. **Genetic** Familial tendency.
2. **Environmental**
i. Sex   Women more susceptible
ii. Activity   Lack of physical activity
iii. Psychogenic   Emotional deprivation/depression
iv. Alcohol   Drinking Problem
V. Smoking   Smoking cessation

3.Drugs e.g. Antipsychotic drugs

Causes of Weight Gain

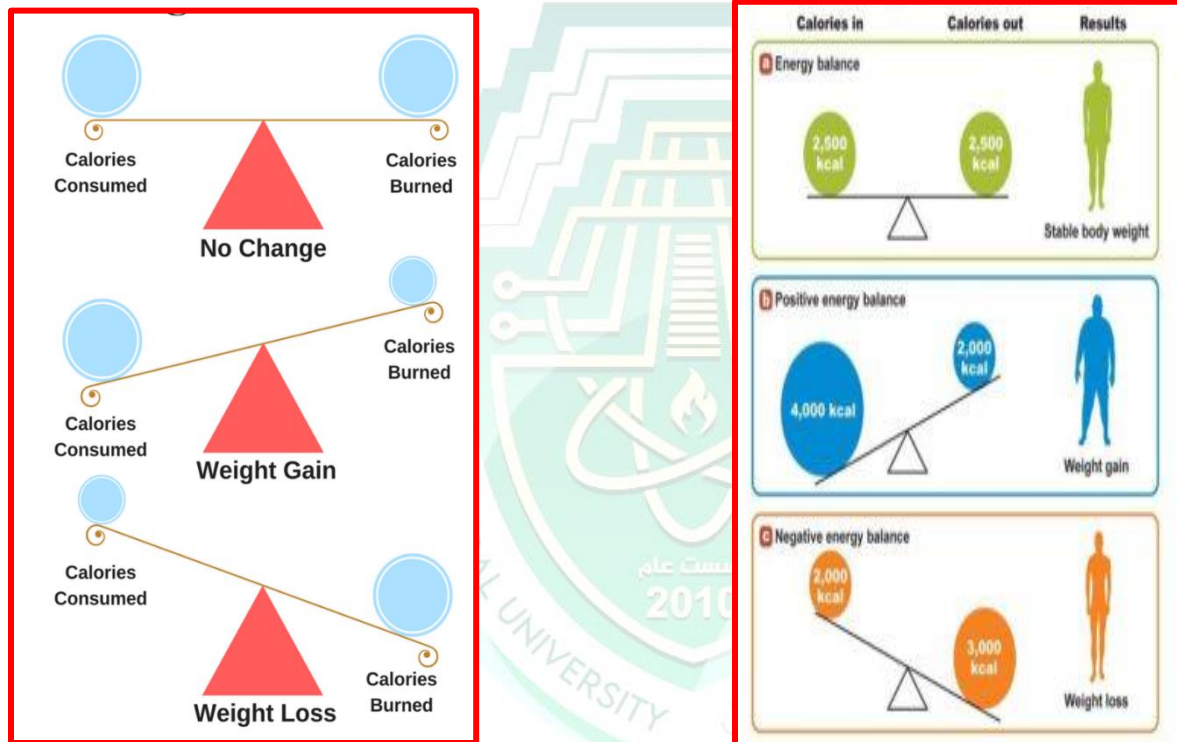**1. Energy imbalance** calories consumed not equal to calories used over a long period of time.
2. Due to a combination of several factors
o Individual behavior
o Social interaction
o Environmental factors
o Genetics :

More in and less out   weight gain
More in and less in   weight loss

3. Hypothalamus: A control center for hunger and satiety
4. Endocrine disorder: Hormonal imbalance

LEPTIN:

A protein hormone produced by adipocytes, Required to keep the body weight under control.

a hormone your body releases that helps it maintain your normal weight on a long-term basis. The level of leptin in your blood is directly related to how much body fat you have. Leptin resistance causes you to feel hungry and eat more even though your body has enough fat stores.

FUNCTIONS: Regulates the amount of body fat by controlling appetite and energy expenditure
1. Signals the brain about fat store levels
2. Increases metabolic rate

3. Decreases appetite in humans
4. Causes and maintain loss of weight (in overweight mice)

SECRETION :

↑In well-fed state (expansion of fat stores)

↓In starvation (depletion of fat stores)

Adiponectin

A protein hormone secreted by adipocytes

Adiponectin levels are
Inversely correlated with **body fat levels**
Directly correlated with **HDL levels**

Low levels are seen in:

1) Metabolic syndrome

2) DM

Functions of Adiponectin:

- Promotes uptake and oxidation of fatty acids and glucose by muscle and liver
- Blocks the synthesis of fatty acids and gluconeogenesis by hepatocytes
- Increases insulin sensitivity / glucose tolerance