

# Biochemistry Aspects of **OBESITY**

**MSc. Roza Talaat**

**Master in Analytical Chemistry**

# ***What is Obesity ?***

**Obesity is a:**

**Disorder of Body Weight Regulatory Systems  
Characterized by  
Accumulation of Excess body Fat**

**Currently, Obesity is Epidemic as:**

**Abundance of Food**

**&**

**Reduced Activity**

# ***Why Obesity is Major Problem ?***

- The risk of **Associated Diseases** has increased:
  - **Diabetes Mellitus**
  - **Hypertension**
  - **Cardiovascular diseases (Atherosclerosis etc..)**
- **Childhood Obesity**  
( 3 fold increase in prevalence over the last decades )

# Assessment of Obesity

- Aim is to measure amount of body fat
- Direct measurement is difficult
- Indirect measurement:

Body Mass Index (BMI): correlate with amount of body fat in most individuals.

exceptions: athletes : large amounts of lean muscle mass.

$$\text{Body Mass Index} = \frac{\text{Weight in Kg}}{2 \text{ (Height in Meters)}}$$

less than 19.5 : Underweight

19.5 – 25 : Healthy

25 – 29.9 : Overweight

30 or more : Obese

# Anatomic Differences in Fat Deposition

Anatomic distribution of body fat has a major influence on associated health risks

- **Android, Apple-Shaped or Upper Body Obesity**

Excess fat in central abdominal area

**Waist to Hip** > 1 in Men  
> 0.8 in Women

Common in **males**

Associated with a **greater risk** of hypertension, insulin resistance, DM, dyslipidemia & coronary heart diseases

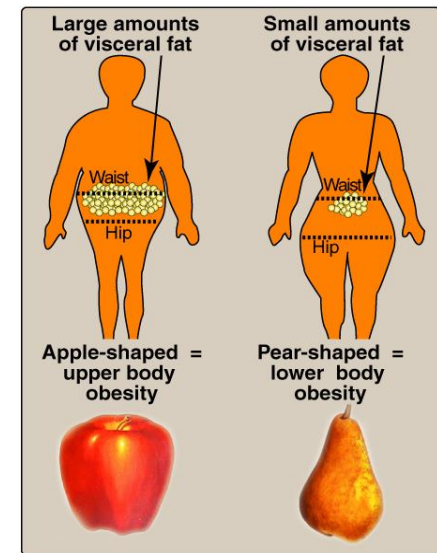
- **Gynoid, Pear-Shaped or Lower Body Obesity**

Excess fat in lower extremities around the hips or gluteal region

**Waist to Hip** < 1 in Men  
< 0.8 in Women

**Relatively benign healthwise**

Common in **females**



**Figure 26.3**  
Individuals with more upper body fat (left) have greater health risks than pear-shaped individuals (right).

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# Waist to Hip Ratio Measurements

	Acceptable	
	Perfect	Good
Male	< 0.85	0.85 – 0.90
Female	< 0.75	0.75 – 0.80

Health Risk	Women	Men
Low	0.80 and less	0.95 and less
Moderate	0.81 - 0.85	0.96 - 1.0
High	0.86 and more	1.0 and more

# ***Obesity & Health***

**Obesity is  
*a Risk Factor for Many Chronic Diseases***

**Type 2 DM**

**Hypercholesterolemia**

**High plasma level of triacylglycerol**

**Hypertension**

**Coronary Heart Diseases**

**Some Cancers**

**Gallstones**

**Arthritis**

**Gout**



# ***Biochemistry Principles of Weight Reduction***

## **GOALS of weight management in obese patients:**

- To induce negative energy balance to reduce body weight by decreasing caloric intake and/or increase energy expenditure
- To maintain a lower body weight over a longer term

## Weight Reduction:

# *1- Physical Activity*

### **Benefits:**

- Increases cardiopulmonary fitness
- Reduces risk of cardiovascular diseases (independent on weight loss)

*Combination of*

*Caloric Restriction + Exercise + Behavioural Treatment*

*is expected to*

*Reduce 5 – 10 % of weight over a period of 4-6 months*

*Physical activity is essential for maintaining weight reduction*

# Weight Reduction:

## ***1- Caloric Restriction***

- 1 pound of adipose tissue ( **about 0.5 kg**) corresponds to about **3500 Kcal**
- Ineffective for a long term for many obese individuals
- More than 90% regain the lost weight after suspension of dieting
- **Benefits of caloric restriction**
  - Reduction of 10% of weight over a 6-month period often:
    - *Reduces Blood Pressure*
    - *Reduces Lipid levels*
    - *Enhance Control of Type 2 DM*

## Weight Reduction:

### ***1- Pharmacological Treatment***

- **For BMI 30 or more:**

**1- Sibutramine:**

**Appetite suppressant**

**inhibits serotonin & norepinephrine reuptake**

**2- Orlistat:**

*lipase inhibitor that inhibits gastric & pancreatic lipases*

*It inhibits digestion & hence absorption of about 30% of diet fat.*

**Weight Reduction:**  
***1- Surgical Treatment***

- **Aims at reducing food consumption**
- **Only indicated for severely obese patients**

**Any Questions???**