



**ALAYEN IRAQI**  
UNIVERSITY  
AUIQ



# COLLEGE OF DENTISTRY

الفرع العلمي: العلوم الأساسية

المادة: Biochemistry

المحاضرة: **Glucose Metabolism**

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## Glucose Metabolism

**Glucose:** - One of Carbohydrates compounds, which is a chief source for energy, has a formula ( $C_6H_{12}O_6$ ).

### Glucose metabolism:

The digestion of carbohydrates actually starts in the mouth where an enzyme called **salivary amylase** starts the breakdown. The rest of the digestion process occurs mainly in the small intestine, polysaccharides and disaccharides converted to monosaccharides (Glucose) by intestinal hydrolytic enzymes, where enzymes break down large carbohydrate molecules into a simpler form called monosaccharides (Glucose) absorption occurred in mucoid membranes cells of small intestine, and transported to the liver or other tissues. The liver and skeletal muscle contains the largest glycogen stores. **Glucose is absorbed into the blood stream and used in several different ways:**

- ❖ Much of the glucose used for immediate energy needs by the cells.
- ❖ If there is more glucose than the cells need, then part of the glucose is stored as glycogen in the liver and muscle tissue. If blood glucose levels drop too low, the body can use this stored glycogen to replenish the supply.
- ❖ After energy needs the glycogen stores filled, any excess glucose converted to fatty acids and stored as fat tissue. The fat tissue has unlimited storage capabilities.



### Need of body for the glucose may be:

1. Metabolized to  $\text{CO}_2 + \text{H}_2\text{O} + \text{energy}$ .
2. Stored as glycogen in the liver.
3. Converted to keto acid and amino acid and protein.
4. Converted to fatty acids and stored in Adipose tissue.

### Regulation of blood glucose:

Body can keep glucose level in fasting condition for more than 8 hour by two method (glycogenesis and glycogenolysis).

- **Blood normally contain glucose:**

60 – 100 mg /dl serum in fasting.

80 – 120 mg /dl ml serum in random.

**Glycosuria:** It is occur when glucose level more than 180 mg \100ml in blood.

### **Hormones effected on the glucose level:**

#### **1- Insulin hormone:**

- a. Stimulates glucose storage as glycogen (muscle and liver) (glycogenesis ).



- b. Stimulates fatty acid synthesis and storage after a high-carbohydrate meal.
- c. Stimulates amino acid uptake and protein synthesis.

## 2- Glucagon hormone:

- ❖ Maintains blood glucose levels during fasting by activates glycogenolysis and gluconeogenesis (liver) during fasting.
- ❖ Activates fatty acid release from adipose tissue.

## 3- Epinephrine hormone:

- ❖ Stimulates glucose production from glycogen (muscle and liver) (glycogenolysis )
- ❖ Stimulates fatty acid release from adipose tissue.

## 4- Hydrocortisone hormone:

- ❖ Stimulates amino acid mobilization from muscle protein.
- ❖ Stimulates gluconeogenesis.
- ❖ Stimulates fatty acid release from adipose tissue.

## 5- Growth hormone and Adrenocorticotrophic:

- ❖ glycogenolysis.

## 6- Thyroxin hormone:

- ❖ Glycogenolysis.



- **Clinical significance of glucose:**

A – **Hyperglycemia:**

- 1- Diabetes mellitus.
- 2- Diabetes coma.
- 3- Sever stress.

B- **Hypoglycemia:**

- 1- Hyper insularism.
- 2- Fasting.
- 3- Hepatic diseases.
- 4- Adrenal and pituitary insufficiency.

**C- Glycosuria:** It is occur when glucose level more than 180 mg \100ml in blood.

GOOD LUCK