

CARBOHYDRATES METABOLISM





GLUCOSE METABOLISM

- **Site of absorption:** Mainly the upper part of small intestine.
- **Route of absorption:** By the portal vein to the liver, i.e., blood stream chiefly in the form of hexoses (glucose, fructose, mannose and galactose) and as pentose sugars (ribose).


Blood values of glucose

- The normal fasting value: **70-110 mg/100 ml.**
- After meal: **120-150 mg/100 ml.**

Glucose sources in human body

- Dietary carbohydrates.
- Liver glycogenolysis.
- Gluconeogenesis.

The fate of absorbed glucose

- Glucose oxidation.
 - Glycogenesis.
 - Lipogenesis.
 - Lose in urine (in special conditions).
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Tissues which maintain glucose balance in blood:

➤ Gastrointestinal tract:

It prevents hyperglycemia (high blood glucose level) after carbohydrate meal. When the glucose contacts with the intestinal mucosa, it secretes into the blood certain factors which stimulate insulin secretion.

➤ The liver:

It plays the most important role in regulation of blood glucose level.

In hyperglycemia: it decreases blood glucose by:

1. Glycogenesis.
2. Oxidation of glucose.
3. Lipogenesis.

In hypoglycemia: it increases blood glucose by:

1. Glycogenolysis.
2. Gluconeogenesis.
3. Interconversion from different hexoses (fructose or galactose) into glucose.

➤ Muscles:

It prevent hyperglycemia by:

1. Glycogenesis.
2. Oxidation of glucose.

➤ Adipose tissue:

It prevent hyperglycemia by increasing lipogenesis.

➤ The kidney:

It prevent glucose loss in urine.

It adds little glucose to the blood by gluconeogenesis.

Hormones which maintain glucose balance in blood:

➤ **Insulin:** it lowers the blood glucose level by increasing:

1. Glycogenesis.
2. Oxidation of glucose.
3. Lipogenesis.
4. Glucose uptakes.

It also inhibits:

1. Glycogenolysis.
2. Gluconeogenesis

➤ **Glucagon and adrenaline:** they increase the blood glucose level by increasing glycogenolysis and gluconeogenesis and inhibiting glycogenesis.

➤ **Glucocorticoids and growth hormone:** they increase the blood glucose level by increasing gluconeogenesis and inhibiting glucose uptake, oxidation and lipogenesis.

➤ **Thyroxine:** it increases the blood glucose level by:

1. Increasing the rate of glucose absorption from intestine.
2. Stimulating glycogenolysis and gluconeogenesis.
3. Inhibiting glycogenesis.
4. Increasing the catabolism of insulin.