



AL-MUSTAQBAL UNIVERSITY COLLEGE

Department of Medical laboratory Techniques Department

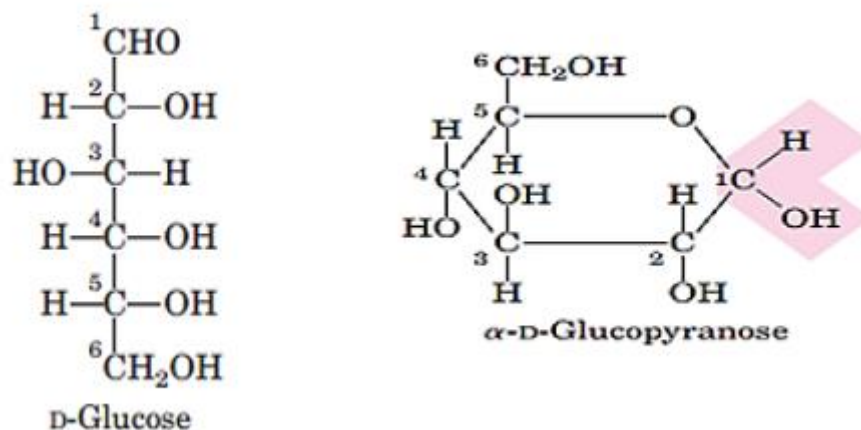
Clinical Biochemistry
(Estimation of Blood Glucose)



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glucose

The blood glucose level is **the amount of glucose in the blood**. Glucose is a sugar that comes from the foods we eat, and it's also formed and stored inside the body. It's the main source of energy for the cells of our body, and it's carried to each cell through the



Organisms rely on the oxidation of complex organic compounds to obtain energy. Three general types of such compounds are carbohydrates, amino acids, and lipids. Although all three are used as a source of energy, carbohydrates are the primary source for brain, erythrocytes, and retinal cells in humans.

Carbohydrates are the major food source and energy supply for the body and are stored primarily as liver and muscle glycogen. Disease states involving carbohydrates are split into two groups—hyperglycemia and hypoglycemia.

blood sugar regulation

The liver, pancreas, and other endocrine glands are all involved in controlling the blood glucose concentrations within a narrow range. During a brief fast, glucose is supplied to the ECF from the liver through glycogenolysis. When the fasting period is longer than 1 day, glucose is synthesized from other sources through gluconeogenesis. Control of blood glucose is under two major hormones: insulin and glucagon, both produced by the pancreas.

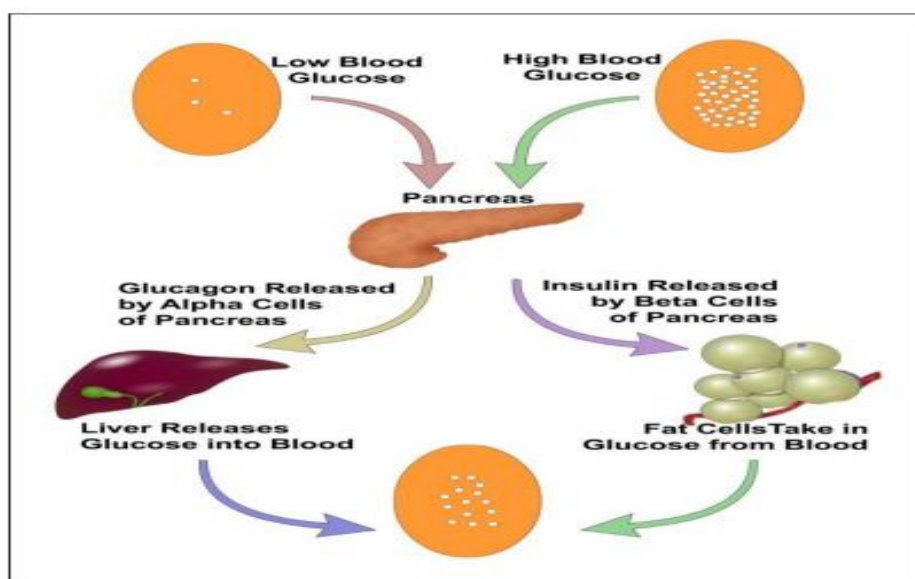
Insulin

Is the primary hormone responsible for the entry of glucose into the cell. It is synthesized by the cells of islets of Langerhans in the pancreas. When these cells detect an increase in body glucose, they release insulin. The release of insulin causes an increased movement of glucose into the cells and increased glucose metabolism. Insulin is normally released when glucose levels are high and is not released when glucose levels are decreased. It can be referred to as a hypoglycemic.

Glucagon

Is the primary hormone responsible for increasing glucose levels. It is synthesized by the cells of islets of Langerhans in the pancreas and released during stress and fasting states. When these cells detect a decrease in body glucose, they release glucagon. Glucagon acts by increasing plasma glucose levels by glycogenolysis in the liver and an increase in gluconeogenesis. It can be referred to as a hyperglycemic.

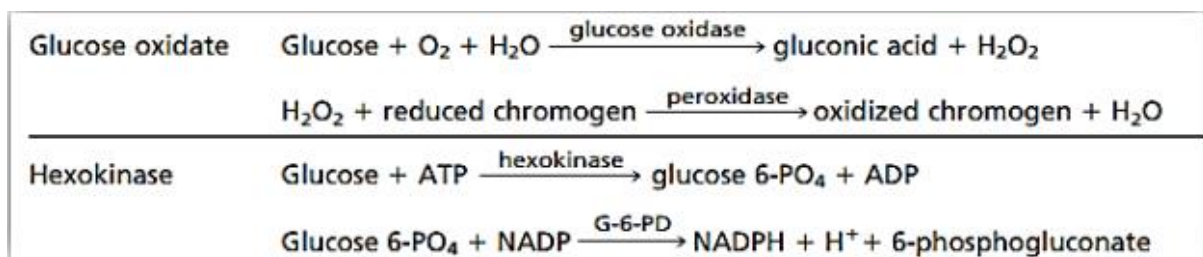
Two hormones produced by the adrenal gland affect carbohydrate metabolism.



Homeostasis of Blood Glucose

Methods of glucose Measurement

Glucose can be measured from serum, plasma, or whole blood. Today, most glucose measurements are performed on serum or plasma. The glucose concentration in whole blood is approximately 11% lower than the glucose concentration plasma. Serum or plasma must be refrigerated and separated from the cells within 1 h to prevent substantial loss of glucose by the cellular fraction, particularly if the white blood cell count is elevated. Sodium fluoride ions (gray-top tubes) are often used as an anticoagulant and preservative of whole blood,



Procedure

- 1- Take the blood from the person.
- 2- Centerifuge the blood to gets the serum.
- 3- Prepare three test tubes and making the additions as in the shown

Table:

	Blank	Standard	Test
Reagent (R1)	1 mL	1mL	1mL
Standard (R2)	-----	10 ML	-----
Serum	-----	-----	10 ML
Distill water	10 ML	-----	-----

- 4- Mix well and let for 5 minutes at 37o C or 10 minutes at room temperature.
- 5- Read the absorbance for standard and test against the blank at wave length 500 nm.

Calculations

Con. of test = (Abs. of test/Abs. of standard) *100 mg/dL

Normal Value according to medical council of Canada

Laboratory Test	Value
Fasting Blood Glucose (FBG) (8h)	4 – 6 mmol/L
Random Blood Glucose (RBG)	4 – 11 mmol/L
Glucose Tolerance Test (GTT) (2 h)	> 7 mmol/L
Hemoglobin A₁ C (HbA_{1c})	4.8% - 6.0%

Hyperglycemia

Hyperglycemia is an increase in plasma glucose levels. In healthy patients, during a hyperglycemia state, insulin is secreted by the beta cells of the pancreatic islets of Langerhans. Insulin enhances membrane permeability to cells in the liver, muscle, and adipose tissue. It also alters the glucose metabolic pathways. Hyperglycemia, or increased plasma glucose levels, is caused by an imbalance of hormones.

Diabetes mellitus

is actually a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both

Type 1 diabetes is caused by impaired insulin production.

Type 2 diabetes is caused by resistance to the action of insulin at the cellular level.

Gestational diabetes occurs during pregnancy and, like type 2, reflects insulin resistance. Gestational diabetes is transient, disappearing after birth, although there is some evidence that women manifesting gestational diabetes during pregnancy are at risk for developing type diabetes later in life. Infants born to mothers who have gestational diabetes are also at risk for development of diabetes.

Symptoms include

- Fruity-smelling breath.
- Dry mouth.
- Abdominal pain.
- Nausea and vomiting.
- Shortness of breath.
- Confusion.
- Loss of consciousness.

Hypoglycemia

Hypoglycemia involves decreased plasma glucose levels and can have many causes—some are transient and relatively insignificant, but others can be life threatening. The plasma glucose concentration at which glucagon and other glycemic factors are released is between 65 and 70 mg/dL (3.6–3.9 mmol/L); at about 50 to 55 mg/dL (2.8–3.0 mmol/L), observable symptoms of hypoglycemia appear.

Symptoms hypoglycemia

- sweating.
- feeling tired.
- dizziness.
- feeling hungry.
- tingling lips.
- feeling shaky or trembling.
- a fast or pounding heartbeat (palpitations)