Class:Third Stage
Subject: Practical Biochemistry
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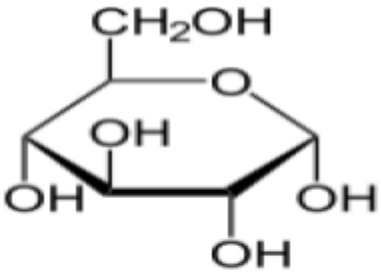
Glucose

Glucose is a sugar with the molecular formula C6H12O6. The name "glucose. The suffix "-ose" is a chemical classifier, denoting a carbohydrate. It is also known as dextrose or grape sugar. With 6 carbon atoms, it is classed as a hexose, a sub-category of monosaccharides. α-D-glucose is one of the 16 aldose stereoisomers. The D-isomer (D-glucose) occurs widely in nature, but the L-isomer (L-glucose) does not. Glucose is made during photosynthesis from water and carbon dioxide



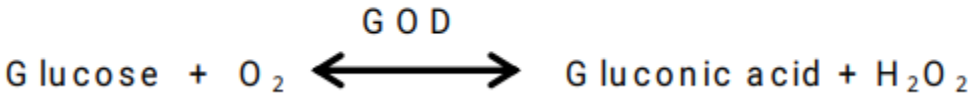
Haworth projection of α-D-glucopyranose

Two Methods of Measuring Blood Glucose Level :

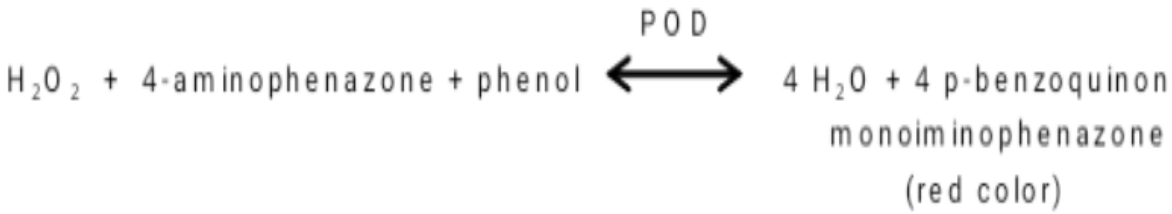
1-Reduction method, which is based on the ability of glucose to reduce Cu ++ to Cu + →less sensitive, →substances that could reduce Cu ++: fructose, galactose, vitamin C, uric acid, etc.

2-Enzymatic method (more specific and precise result) : Glucose is oxidized by glucose oxidase →gluconic acid + H2O2 → red dye

Glucose oxidase (GOD) catalyzes the oxidation of glucose according to the following equation :



The hydrogen peroxide (H2O2)which is formed in the presence of peroxidase (POD)reacts with 4-aminophenazone and phenol and gives rise to 4-benzoquinon mono imino phenazon (a red dye)



Procedure:

Centrifuge 3 ml of blood, 2000 rpm for 10 min.-The serum will be separated from the blood cells. Use serum for sample.

Pipette into each of the three reaction tubes according to the following table :

	Blank	Standard	Sample
Standard glucose	___	10µl	____
Sample serum	___	___	10µl
Reagent	1.0 ml	1.0 ml	1.0 ml

Mix the content of each tube well, then incubate them at 37C°for 10 minutes

Using cuvette tube, read the sample and standard absorbance against the blank at 500 nm.

Calculation:

Calculate the concentration of BL in the provided fasting blood samples using the absorbance reading of standard glucose and applying the following equation:

Glucose (mg/dl) = (Abs. sample/Abs. standard)* standard conc. (100mg\dl)

Normal Range :

Normal (fasting BSL = 70 – 110 mg/dl)

Hypoglycemia

hypoglycemia is defined as a low blood sugar (glucose) level. This reaction happens when there is not enough glucose in blood.

Causes

The most common causes of hypoglycemia are:

1. too much insulin

2. too much exercise

3. not enough food

Symptoms of Hypoglycemia:

1- sweating

2- weakness

3- hunger

4- headache

Hyperglycemia:

Hyperglycemia, or high blood glucose, is the condition found in individuals with diabetes, either insulin-dependent or non-insulin-dependent.

The most common causes of hyperglycemia are:

caused by:

1-not taking enough insulin

2. illness (such as a cold or flu)

3. eating too much

4. certain medications

Symptoms of Hyperglycemia:

1- blood glucose over 240 mg/dl

2- more urine output than usual

3- increased thirst

4- dry skin and mouth

Diabetes mellitus

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

Diabetes mellitus divided into two broad categories:

Type 1, insulin-dependent diabetes mellitus (IDDM);
Type 2, non–insulin-dependent diabetes mellitus (NIDDM)
The third is gestational diabetes

Characteristics of type 1 diabetes include abrupt onset, insulin dependence, and ketosis tendency. This diabetic type is genetically related.

SIGNS AND SYMPTOMS

Signs and symptoms include :

polydipsia (excessive thirst)

polyphagia (increased food intake)

polyuria (excessive urine production)

Rapid weight loss, hyperventilation, mental confusion,

and possible loss of consciousness

Complications: include:

microvascular problems such as nephropathy , neuropathy, and retinopathy.

Increased heart disease is also found in patients with diabetes.

Type 2 Diabetes Mellitus

Characteristics usually include adult onset of the disease and milder symptoms than in type 1, with ketoacidosis seldom occurring

However, these patients are more likely to go into a hyperosmolar coma and are at an increased risk of developing macrovascular and microvascular complications

GESTATIONAL DIABETES MELLITUS (GDM)

Defined as diabetes mellitus that develops during pregnancy Screening is recommended to be performed between 24 and 28 weeks on all .

Glucose Analysis

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1

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6.1

8
21

DO NOT FILL ABOVE
DANGER
22