



**Ministry of Higher Education and Scientific Research**

**Future university**

**College of Science**

**Department of Medical Physics**

**The two Lecture**

**Blood sugar test Experiment**

**Stage Four - Practical Side**

**Medical Physics Laboratory**

**For morning and evening study**

**BY**

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## **What is a blood sugar meter?**

It is a device used at home to measure the level of sugar (glucose) in the blood.

**Its uses:** It is used by diabetics to monitor and record the levels of sugar (glucose) in the blood, and the patient and the doctor can use these readings or recordings for several purposes, which are: Making adjustments to the doses of medications in the treatment plan if necessary.

### **Components (tools):**

Blood sugar reading device.

Single-use needles.

Strips on which drops of blood are placed for analysis.

Some types of devices may come with strips to measure the level of ketones in the blood (type 1 diabetes).

A wire or connection used to connect the device to computers (used by the doctor, nurse, or diabetes educator) to know the readings that were monitored and recorded in the device.

### **How to use:**

The method of use varies from one device to another depending on the company and version of the device, but there are some general steps to follow for use:

Ensure that hands are clean and wash them with soap and water.

**Insert the strip into the designated place in the device.**

**Inject the finger to obtain blood and analyze it.**

**Place the blood on the analysis strip inserted into the device.**

**Record the reading shown on the device in the follow-up book.**

**Dispose of the needle and analysis strip in a designated box, or place them in a tightly sealed box; as they are biological waste and may contaminate or cause injuries to others when placed in the regular trash can.**

**General instructions:**

**Check the expiration date of the strips:**

**It is important to check the expiration date of the strip box before starting to use it.**

**If there is more than one box, start using the oldest expiration date first, so that none of them expire and are not used.**

**The expiration date of the strips (strips) lasts from 3 to 6 months from the date of opening, but of course this varies from one company to another, and it is recommended to review the instruction sheet accompanying the device to make sure of this.**

**Low battery:**

If some strange or unexpected readings appear (such as the device showing a low blood sugar level despite not feeling any fatigue or other symptoms indicating this), it is recommended to check the effectiveness of the battery, and try a new one to make sure that the problem is not with the device but rather due to a weak battery.

**ERROR word appears:**

Sometimes the word Error or Code Error may appear on the screen, meaning that there is an error in the device. It usually appears for several reasons, which are:

The amount of blood is not sufficient to determine the sugar measurement.

The strip is inserted incorrectly.

The strip used is not suitable for the device, or it is damaged.

The temperature of the strip is high (such as being in a place exposed to sunlight or left in a car) or very cold (in the refrigerator).

Storing blood test strips:

Store them at normal room temperature.

Do not put them in the refrigerator, as the cold will damage the strips.

Do not expose them to sunlight or moisture, as both will damage the strips.

Do not take them out of the box unless they are used, and make sure to close the box tightly after taking the strip.

Do not use the strip if it falls to the ground or if food or liquids spill on it.

What do the blood sugar symbols mean?

Glucose test codes generally include: HbA1c (HbA1c), FBG (fasting glucose), RBG (random glucose), OGTT (oral glucose tolerance test).

Glycated hemoglobin (A1C) test

This test shows your average blood sugar level over the past two to three months.

In general:

Less than 5.7% is normal

5.7% to 6.4% is prediabetes

6.5% or higher on two separate tests is diabetes

Some conditions can affect the accuracy of the A1C test, such as pregnancy or having an abnormal type of hemoglobin.

Fasting blood sugar test

**A blood sample is taken after you haven't eaten for at least eight hours or overnight (fasting).**

**Blood sugar values are measured in milligrams of sugar per deciliter (mg/dL) or millimoles of sugar per liter (mmol/L) of blood. In general:**

**Normal is less than 100 mg/dL (5.6 mmol/L)**

**A level of 100 to 125 mg/dL (5.6 to 6.9 mmol/L) is considered prediabetes**

**A level of 126 mg/dL (7.0 mmol/L) or higher on two separate tests is considered diabetes**

### **Oral glucose tolerance test:**

**This test is less commonly used than others, except during pregnancy. You will need to fast overnight and then drink a sugary liquid in your primary care doctor's office or a lab testing site. Your blood sugar levels are measured at regular intervals over the next 2 hours.**

### **In general:**

**A normal range is less than 140 mg/dL (7.8 mmol/L)**

**A range of 140 to 199 mg/dL (7.8 to 11.0 mmol/L) is consistent with prediabetes**

**A result of 200 mg/dL (11.1 mmol/L) or higher after two hours indicates diabetes**

**If you have prediabetes, your doctor will usually check your blood sugar levels at least once a year.**

### **Children and prediabetes testing**

**Type 2 diabetes is becoming more common in children and teens, likely due to the rise in childhood obesity.**

**The American Diabetes Association recommends testing for prediabetes in children who are overweight or obese and who have one or more other risk factors for type 2 diabetes, such as:**

**A family history of type 2 diabetes**

**Ethnicity associated with increased risk**

**Low birth weight**

**Being born to a mother with gestational diabetes**

**Blood sugar levels during normal, prediabetes, and diabetes are similar in children and adults.**

**Children with prediabetes should be screened for type 2 diabetes annually, or more frequently if their weight begins to change or they develop signs or symptoms associated with diabetes, such as excessive thirst, frequent urination, fatigue, or blurred vision.**

**For more information**

**Glucose tolerance test**

**A1C test**

### **Treatment:**

**Healthy lifestyle choices can help you bring your blood sugar levels back to normal or prevent them from reaching type 2 diabetes levels.**

**To prevent prediabetes from developing into type 2 diabetes, try these things:**

**Eat healthy foods. A diet rich in fruits, vegetables, nuts, whole grains, and olive oil is linked to a lower risk of prediabetes. Choose foods that are lower in fat and calories and higher in fiber. Try to vary your food choices to meet your goals without compromising on taste or nutrients.**

**Increase physical activity. Physical activity helps control weight, burns sugar for energy, and helps your body use insulin more effectively. Aim for at least 150 minutes of moderate-intensity aerobic exercise or 75 minutes of vigorous-**



**intensity aerobic exercise each week, or a combination of moderate and vigorous exercise.**

**Losing excess weight. If you're overweight, losing just 5% to 7% of your body weight — about 14 pounds (6.4 kilograms) if you weigh 200 pounds (91 kilograms) — can reduce your chances of developing type 2 diabetes. To keep your weight within a healthy range, focus on making lasting changes to your eating and exercise habits.**

**Quit smoking. Quitting smoking improves insulin's ability to work better, which in turn improves your blood sugar levels.**

**Take medications as needed. If you're at high risk for diabetes, your doctor may prescribe metformin (Glumetza). He or she may also prescribe medications to control cholesterol and high blood pressure.**

### **Children and prediabetes treatment**

**Children with prediabetes should follow the lifestyle changes recommended for adults with type 2 diabetes, including:**

**Lose weight**

**Eat less refined carbohydrates and fats and more fiber**

**Reduce portion sizes**

**Eat out less often**

**Spend at least one hour a day being physically active**

**Medications are generally not recommended for children with prediabetes unless lifestyle changes improve their blood sugar levels. If medication is needed, metformin is usually prescribed.**

