



AL-Mustaqbal University College

**Medical laboratory Techniques
Department**

Clinical Biochemistry

**Lecture two (2)
Diabetes Mellitus (DM)**



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1- What is diabetes?

Diabetes mellitus (DM) is a chronic condition that is characterised by raised blood glucose levels (Hyperglycemia).

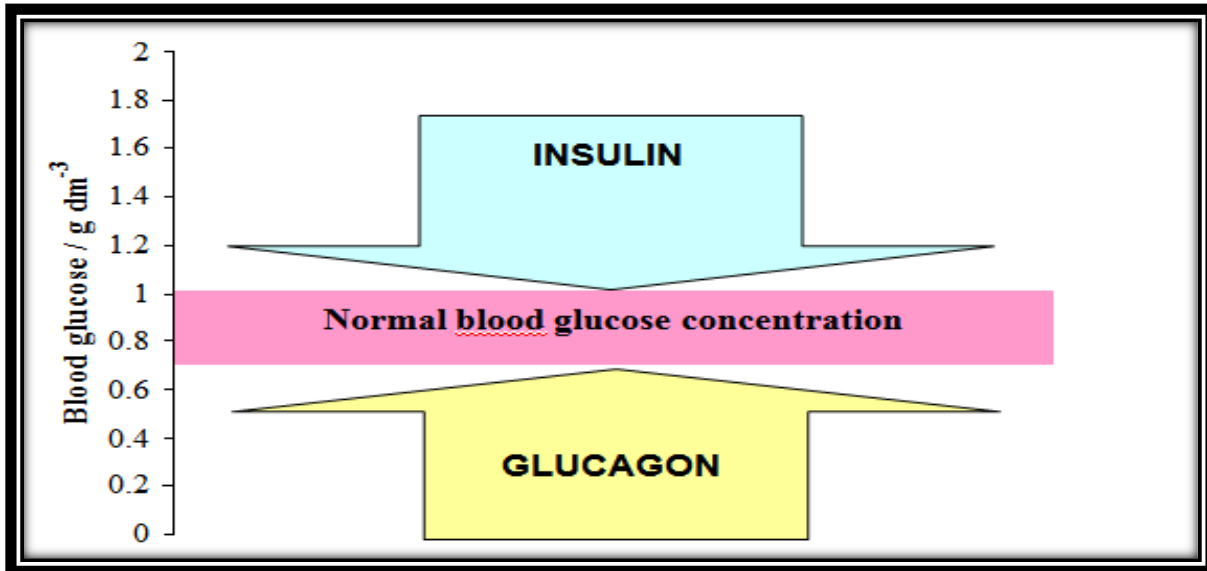


Figure1 Regulating blood sugar

What happens if glucose is not regulated?

If the body does not regulate blood glucose concentration, it can become too high or too low, causing serious problems.

- A. **Hyperglycaemia** occurs when the blood glucose concentration becomes too high. This can lower the water potential of the blood, which can create osmotic problems that can cause dehydration. **Symptoms** include thirst, frequent urination, glucose in the urine and ultimately coma.
- B. **Hypoglycaemia** occurs when the blood glucose concentration becomes too low. This can occur when there is no store of glycogen. It can result in cells being deprived of energy.

Symptoms include nausea, loss of concentration and ultimately coma.

2-Types of Diabetes of DM

There are four major types of diabetes: type 1, type 2, gestational, and “other.”

A-Type 1 Diabetes (insulin-dependent)

Type 1 diabetes, or T1DM, is characterized by insufficient insulin secretion. Type 1 diabetes usually results from autoimmune destruction of the beta cells in the pancreas. People with type 1 diabetes need exogenous (sources outside the body) insulin to survive.

B-Type 2 Diabetes (Resistant to Insulin or Insulin-Independent)

Type 2 diabetes, or T2DM, is the most common form of diabetes, and is characterized by insulin resistance, or sluggish response of insulin after food consumption and beta cell deterioration. Type 2 diabetes represents 90% of all people with diabetes.

C-What is gestational diabetes (GDM)?

Gestational diabetes occurs when there is a high blood glucose level during pregnancy. As pregnancy progresses, the developing baby has a greater need for glucose. Hormone changes during pregnancy also affect the action of insulin, which brings about high blood glucose levels.

Pregnant women who have a greater risk of developing gestational diabetes include those who:

- Are over 35 years old.
- Are overweight.
- Have a family history of diabetes.
- Have a history of polycystic ovary syndrome (PCOS).

Blood glucose levels usually return to normal after childbirth. However, women who have had gestational diabetes have an increased risk of developing Type 2 diabetes later in life.

Changes in Glucose and Insulin Interaction in GDM

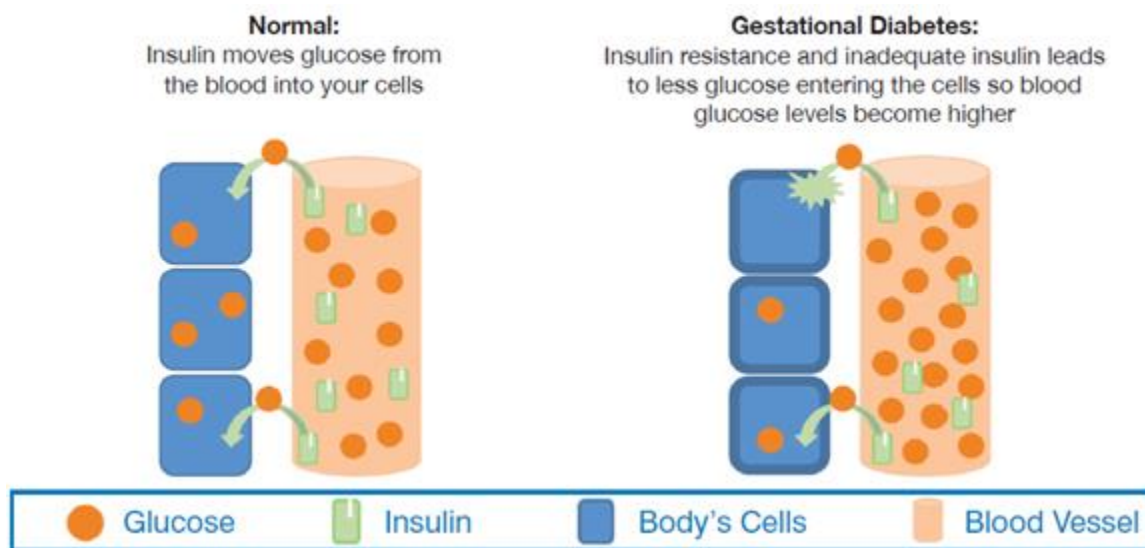


Figure2 Changes in Glucose and Insulin Interaction in GDM

D-Other Types of Diabetes

Types of diabetes that fall into the “other” class of diabetes mellitus include MODY, LADA

- a) **MODY** (**Maturity Onset Diabetes of the Young**) is a genetic mutation in an autosomal dominant gene that affects insulin production. Individuals with this diagnosis are generally children less than age 25 with a family history of diabetes for generations.
- b) **LADA** (**Latent Autoimmune Diabetes in Adults**) presents in young adults in their twenties and can be confused as type 2 because of age; they are clinically between type 1 and type 2.

4- What causes diabetes?

The causes of diabetes are not known. The following risk factors may increase your chance of getting diabetes:

- Family history of diabetes or a personal history of gestational diabetes.
- Injury to the pancreas (such as infection, tumor).
- Autoimmune disease.
- Age (risk increases with age).
- Physical stress (such as surgery or illness).

There are risk factors that you might have more control over, including:

- [High blood pressure](#).
- Abnormal blood cholesterol or triglyceride levels.
- Smoking.
- Being overweight.
- Use of certain medications, including steroids

What are the symptoms of diabetes?

The symptoms of diabetes include:

- Weak, tired feeling.
- Increased thirst.

- Increased hunger (especially after eating).
- Dry mouth.
- Frequent urination.
- [Unexplained weight loss](#) (even though you are eating and feel hungry).

Other symptoms include:

- Blurred vision.
- Numbness or tingling in the hands or feet.
- Slow-healing sores or cuts.
- Dry and itchy skin.
- Frequent [yeast infections](#) or [urinary tract infections](#).

What are the symptoms of low blood sugar?

- ✓ Common early symptoms of low blood sugar include the following:
 - ✓ Feeling weak or dizzy, including trembling and feeling shaky.
 - ✓ Feeling hungry.
 - ✓ Sweating.
 - ✓ Pounding heart.
 - ✓ Pale skin.

How to Determine Whether You Have Diabetes Prediabetes or Neither ?

1. The A1C test

- at least 6.5% means diabetes
- between 5.7% and 5.99% means prediabetes
- less than 5.7% means normal

2. The FPG (fasting plasma glucose) test

- at least 126 mg/dl means diabetes
- between 100 mg/dl and 125.99 mg/dl means prediabetes
- less than 100 mg/dl means normal.

3. **2 hour's postprandial blood glucose:** The patient given 75-100g of glucose, so if the glucose level after 2 hours is 200mg/dl it is diabetes mellitus (Random blood sugar). 140-180mg/dl prediabetic and below 140mg/dl normal .
4. **Oral glucose tolerance test:** Reflect the rate of the absorption, uptake by the tissue and excretion in urine of glucose after 1/2, 1, and 2 hours following intake source of sugar. The normal readings are 170mg, 120mg, and 110mg/dl.