

# Department Of Biochemistry

## Subject: Diabetes Mellitus

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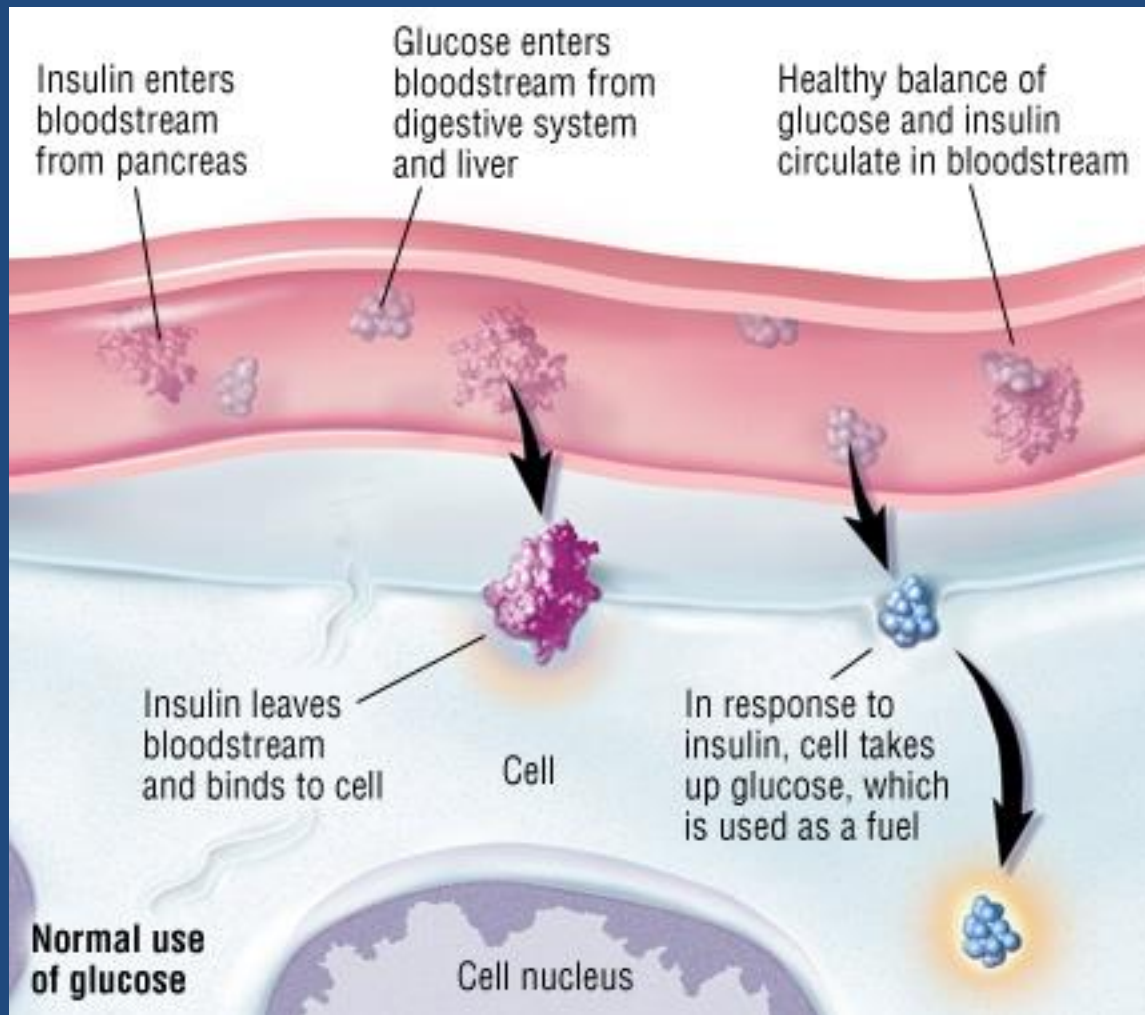
# Diabetes mellitus : Type 1 & Type 2

# What is diabetes mellitus?

- **Diabetes mellitus:** (DM) is a group of diseases characterized by high levels of blood glucose termed as “**Hyperglycemia**” resulting from defects in insulin production, insulin action, or both.
- **Insulin** is a hormone produced by the pancreas. It helps to regulate the body’s blood sugar levels.
- Specifically secreted from Beta cells in the pancreas.

# Normal functioning of insulin

- Pancreatic cells continuously monitor blood glucose levels.
- As your **blood glucose levels rise**, beta cells in the pancreas respond by secreting **insulin** into the blood. Glucose then passes into your cells and the liver shuts down glucose production.
- It binds to the cell surface and stimulates the entrance of glucose into the cell so as to consume it as fuel ,If **blood glucose levels drop too low** alpha cells in the pancreas release another hormone called **glucagon**. This hormone signals the liver to convert amino acids and glycogen into glucose that is sent into the blood.



## Normal function of insulin

Note: Without insulin the glucose can not enter through the cell wall.

# Types Of diabetes mellitus

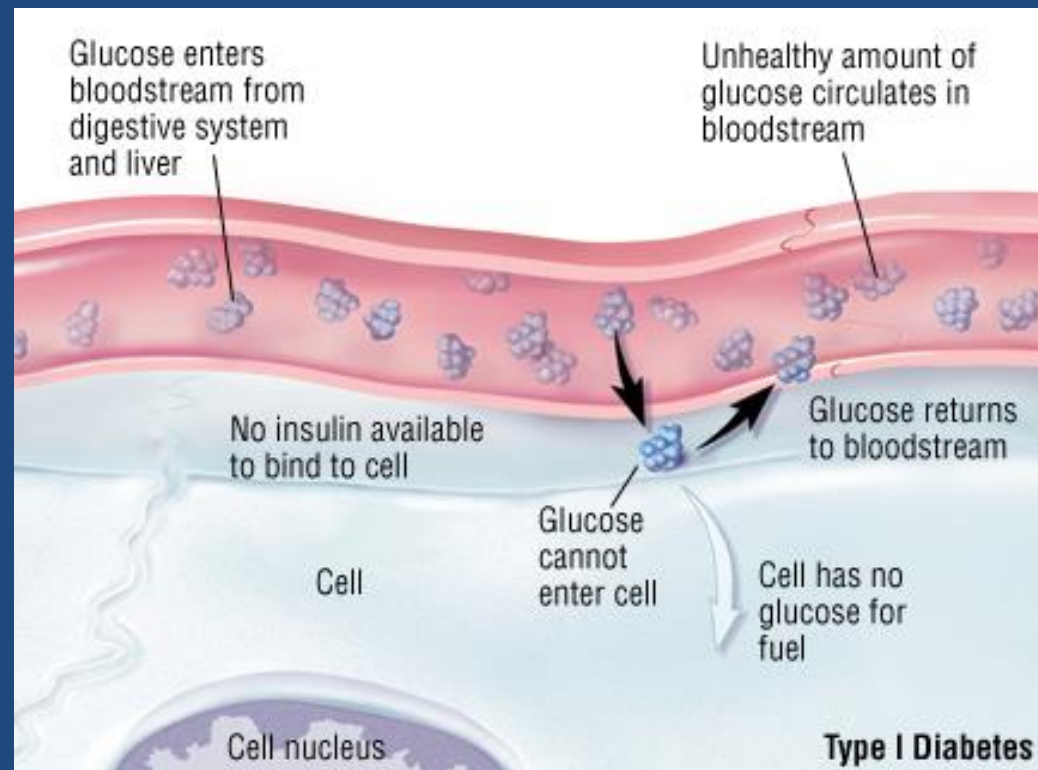
- There are two types of Diabetes Mellitus:
- **Type I :**
- is a disease in which the body does not make enough insulin to control blood sugar levels. It was previously called **insulin-dependent diabetes** or **juvenile diabetes**
- occurs when some or all of the pancreas's insulin-producing cells are destroyed. This leaves the patient with little or no insulin. Without insulin, sugar accumulates in the bloodstream rather than entering the cells. As a result, the body cannot use this glucose for energy.

- When cells can't use glucose for energy, they have to use something else. As an **alternative fuel**, the liver produces **acidic substances called ketones**. These ketones build up in the blood. They make the blood abnormally acidic. This creates a severe, potentially life-threatening condition called **ketoacidosis**. Ketoacidosis can cause heart problems and affect the nervous system

- Type 1 diabetes is an **autoimmune disease**. This means it begins when the body's immune system attacks cells in the body. In type 1 diabetes, the immune system destroys insulin-producing cells (beta cells) in the pancreas.
- Why the immune system attacks the beta cells remains a mystery. Experts suspect that some people are genetically predisposed to the disease. And an environmental factor may act as a trigger. Viral infections and diet are two possible triggers.



- Type 1 diabetes is a chronic disease. It is diagnosed most commonly between ages 10 and 16.
- It equally affects males and females.



# Symptoms of type 1

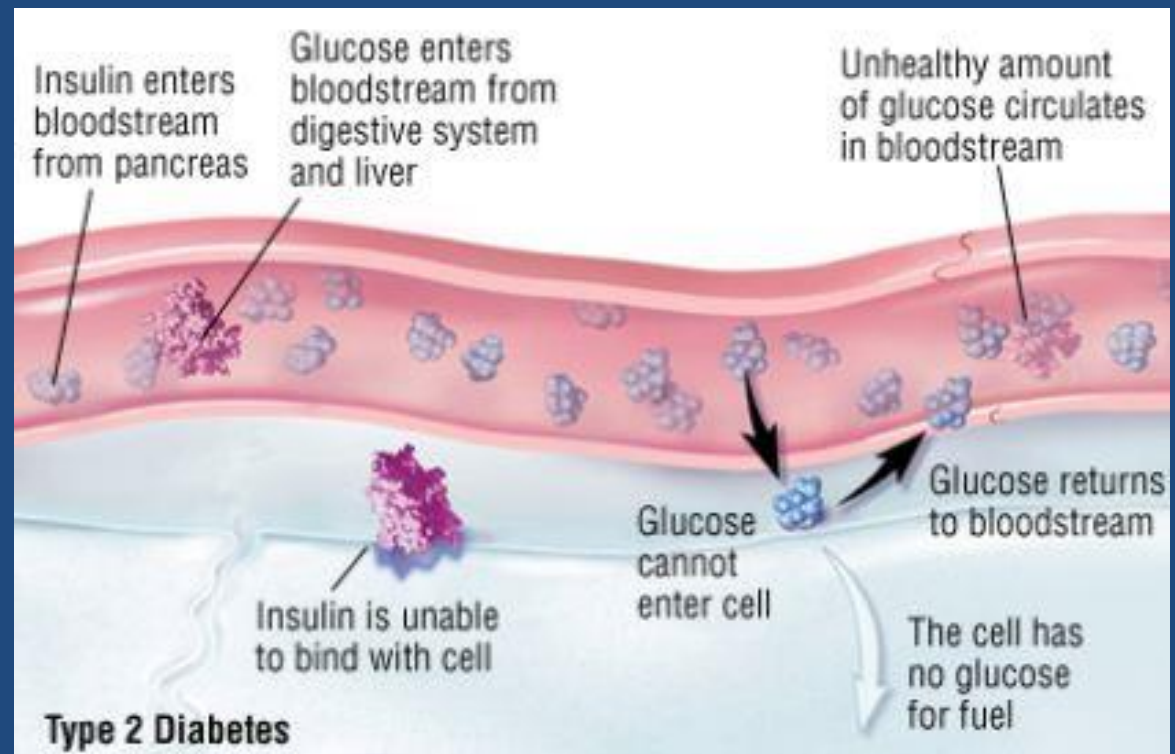
Symptoms usually come on suddenly and strongly:

- 1. Extreme thirst, frequent urination and vomiting.**
- 2. Children may start to wet the bed again. Weight loss, with no loss of appetite, can be one of the first signs in children.**
- 3. If the disease is untreated, sugar and ketone buildup in the blood can cause weakness, confusion, coma and even death.**

# Type II Diabetes Mellitus

- Is a chronic disease. It is characterized by high levels of sugar in the blood. It's also called **type 2 diabetes mellitus, adult-onset diabetes, non-insulin-dependent diabetes**, or just diabetes.
- It occurs when your body's cells do not react efficiently to insulin. This condition is called **insulin resistance**.
- In people with insulin resistance, the pancreas first makes extra insulin to maintain a normal blood sugar. Over time, the body's insulin resistance gets worse. The pancreas cannot keep up with the demand for more and more insulin and stops its production. As a result, blood glucose levels rise.

- It runs in families. It most often affects people who are **older than 40**. But type 2 diabetes is now being seen in more and more young people. Obesity greatly increases the risk of diabetes.



# Symptoms of type II

-The symptoms of diabetes are related to high blood glucose levels. They include:

**1.Excessive urination, thirst and hunger**

**2.Weight loss**

**3.Increased susceptibility to infections, especially yeast or fungal infections**

# Diagnosis

## Tests for type 1 and type 2 diabetes:

- 1. Fasting plasma glucose (FPG) test:** Blood is taken in the morning after fasting overnight. Normally, blood sugar levels remain between 55 and 100 milligrams per deciliter (mg/dL). Diabetes is diagnosed if a fasting blood sugar level is 126 mg/dL or higher.
- 2. Oral glucose tolerance test (OGTT):** Blood sugar is measured two hours after drinking 75 grams of glucose. Diabetes is diagnosed if the 2-hour blood sugar level is 200 mg/dL or higher.
- 3. Random blood glucose test:** A blood sugar of 200 mg/dL or greater at any time of day combined with symptoms of diabetes is sufficient to make the diagnosis.
- 4. Hemoglobin A1C (glycohemoglobin):** This test measures the average glucose level over the prior two to three months. Diabetes is diagnosed if the hemoglobin A1C level is 6.5% percent or higher, a normal A1C level can range from 4.5 to 6 percent.

# Treatment

- The goal of diabetes treatment is to keep blood glucose levels close to normal ,the treatment include:

## 1. Dietary Management and Physical Activity:

Modifying eating habits and increasing physical activity are typically the first steps toward reducing blood sugar levels.

## 2. Insulin Therapy:

People with type 1 diabetes require multiple insulin injections each day to maintain safe insulin levels. Insulin is often required to treat type 2 diabetes too. Insulin is delivered through a small tube (catheter) that is placed under the skin (usually in the abdomen).

- There are four major types of insulin:
  - Rapid-acting
  - Short-acting
  - Intermediate-acting
  - Long-acting
- Your doctor will determine your dose and how often you need to take insulin.



### 3.Oral Medications:

Sometimes blood sugar levels remain high in people with type 2 diabetes even though they eat in a healthy manner and exercise. When this happens, medications taken in pill form may be prescribed. The medications work in several different ways. These include improve the effectiveness of the body's natural insulin, reduce blood sugar production, increase insulin production and inhibit blood sugar absorption. Oral diabetes medications are sometimes taken in combination with insulin.





# Examples of oral medications:

- The first successful “diabetes pills” were the **sulfonylureas**, they’re chemicals that cause your pancreas to produce more insulin.
- More recently, another group of oral medications have been developed that, like the sulfonylureas, stimulate increased insulin production. These medicines, called by the brand names **Prandin** and **Starlix**, are more effective than the first generation of drugs.
- Newer diabetes medications attack type 2 at its source: “insulin resistance,”  
TZD’s (trade names **Actos** and **Avandia**) directly attack the problem, making the body (temporarily) more sensitive to insulin action.



*Thank You*