Diabetes

What is Diabetes Mellitus?

Normal Glucose Metabolism

- When the amount of glucose in the blood increases, e.g., after a meal, it triggers the release of the hormone insulin from the pancreas. Insulin stimulates muscle and fat cells to remove glucose from the blood and stimulates the liver to metabolize glucose, causing the blood sugar level to decrease to normal levels.
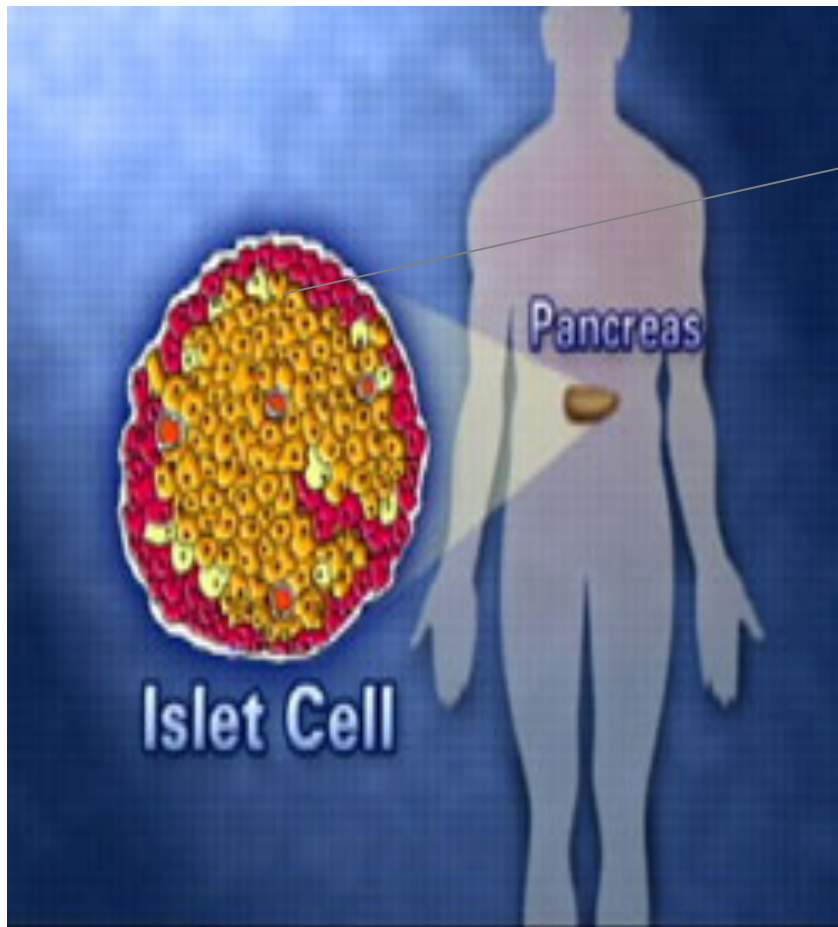
Diabetes Mellitus

- Diabetes mellitus is a metabolic disorder characterized by abnormally high levels of sugar (glucose) in the blood.
- Condition of high levels of glucose in the blood is called Hyperglycemia.
- Hereditary and Environmental causes.

Causes of Hyperglycemia

- Insulin is a hormone secreted from the islet cells of the Pancreas.
- Insulin enables cells to absorb glucose in order to turn it into energy, thereby keeping the normal blood glucose level in the blood.
- In diabetes, blood sugar levels remain high, may be because insulin
  - -- is not being produced at all
  - -- is not made at sufficient levels, or
  - -- is not as effective as it should be.

This causes glucose to accumulate in the blood, often leading to various complications.

If insufficient/lack of insulin

↓

Glucose can't enter the cell

↓

Glucose remains in blood

↓

Diabetes Mellitus/Hyperglycemia

Types of Diabetes

There are mainly three types of diabetes:

- Type I or insulin dependent diabetes often called **juvenile onset** diabetes,
- Type II or non-insulin dependent diabetes often called **adult onset** diabetes &
- Gestational diabetes.

The most common forms of diabetes are type 1 diabetes (5%), which is an autoimmune disorder. and Type 2 diabetes (95%), which is associated with obesity.
Gestational diabetes is a form of diabetes that occurs in pregnancy.
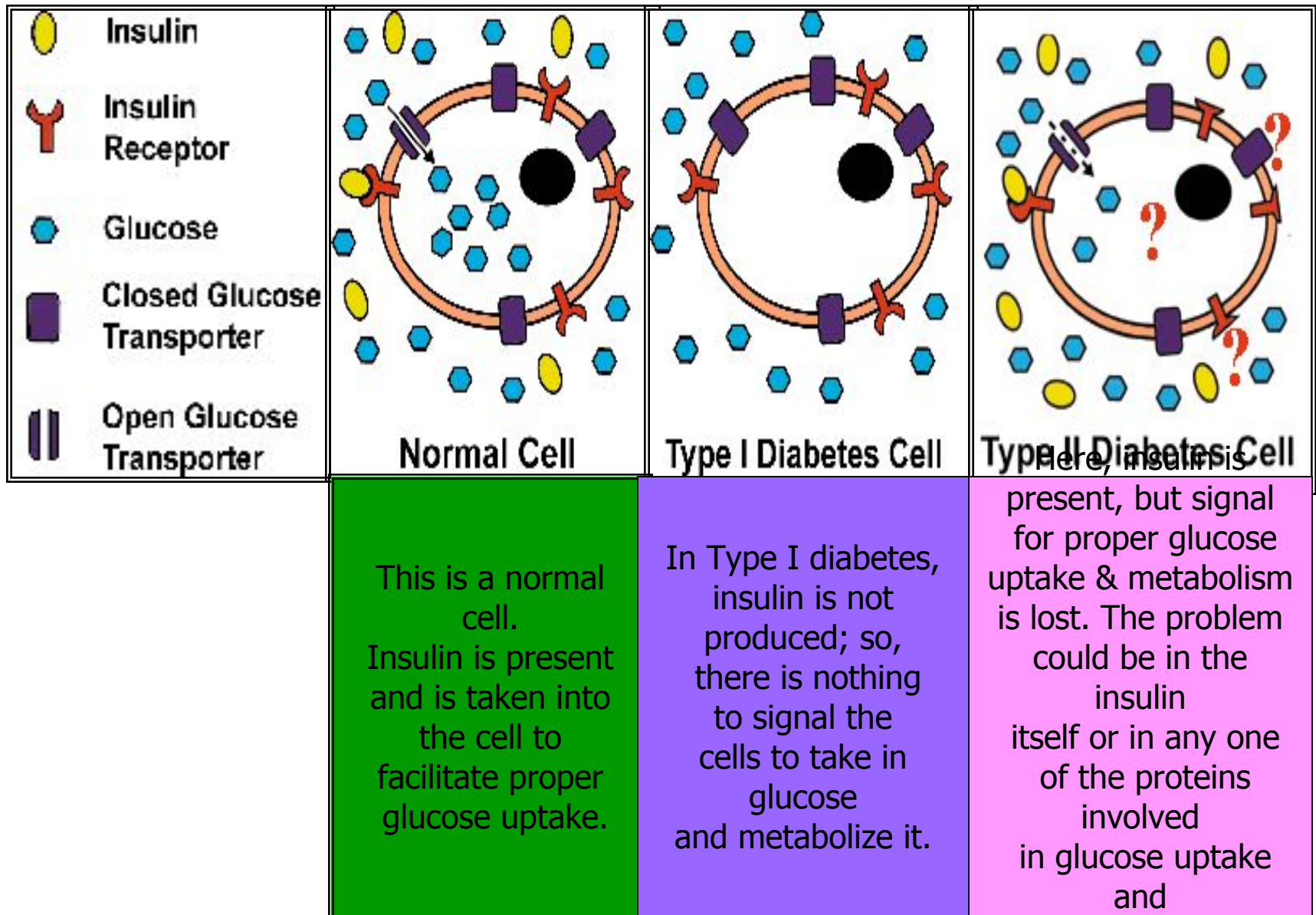
Type 1 diabetes:

- most commonly occurs in children
- is a result of the body's immune system attacking and destroying the beta islet cells.
- The trigger for this autoimmune attack is not clear, but the result is the end of insulin production.

Type 2 diabetes

- Type 2 diabetes commonly occurs in adults who are obese.
- There are many underlying factors that contribute to the high blood glucose levels in these individuals.
- An important factor is the body's resistance to insulin in the body, essentially ignoring its insulin secretions.
- A second factor is the falling production of insulin by the beta cells of the pancreas.
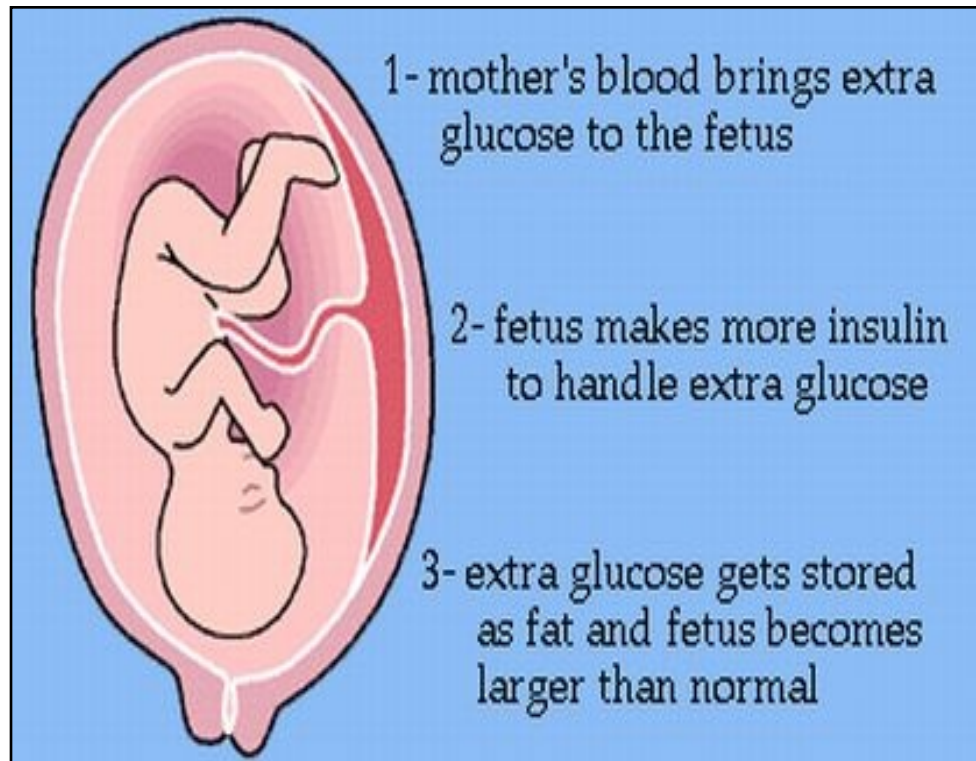
Therefore, an individual with type 2 diabetes may have a combination of deficient secretion and deficient action of insulin.

Type I & II Diabetes : Insulin Response

| Insulin |
| Insulin Receptor |
| Glucose |
| Closed Glucose Transporter |
| Open Glucose Transporter |

Normal Cell

Type I Diabetes Cell

Type II Diabetes Cell

This is a normal cell.
Insulin is present and is taken into the cell to facilitate proper glucose uptake.

In Type I diabetes, insulin is not produced; so, there is nothing to signal the cells to take in glucose and metabolize it.

Here, insulin is present, but signal for proper glucose uptake & metabolism is lost. The problem could be in the insulin itself or in any one of the proteins involved in glucose uptake and

Gestational Diabetes- 3rd Type of Diabetes

Gestational diabetes is diabetes that happens for the first time when a woman is pregnant. Gestational diabetes goes away when any woman has her baby, but it increases her risk for having diabetes later.

1- mother's blood brings extra glucose to the fetus

2- fetus makes more insulin to handle extra glucose

3- extra glucose gets stored as fat and fetus becomes larger than normal

Due to Gestational Diabetes- the baby has risks for-

Macrosomia - refers to a baby that is considerably larger than normal.

Birth injury - may occur due to the baby's large size and difficulty being born.

Hypoglycemia –refers to low blood sugar in the baby immediately after delivery.

Respiratory distress-difficulty breathing

Signs & Symptoms

HIGH BLOOD SUGAR *Hyperglycemia*

Signs and Symptoms:

Dry Mouth

Extreme Thirst

gulp gulp gulp

Sudden Weight Loss

Always Hungry

Frequent Urination

Always Tired

Frequent Bed wetting

Stomach Pain

Wounds that won't heal

Diagnosis

Diabetes is diagnosed by measuring the blood glucose level during fasting (Fasting plasma glucose test) or an oral glucose tolerance test.

Three status associated with diabetes: people who are not diabetic; those with Impaired Glucose Tolerance (IGT); and those with diabetes.

Category	Blood Glucose (mg/dL)	
	Fasting	After meal
Normal	<115	<140
Diabetic	>140	>200
Impaired Glucose Tolerance	<140	140-199

Lipid profile

What is a lipid profile?

The lipid profile is a group of tests that are often ordered together to determine risk of coronary heart disease. The tests that make up a lipid profile are tests that have been shown to be good indicators of whether someone is likely to have a heart attack or stroke caused by blockage of blood vessels (hardening of the arteries).

Your Lipid Profile

When doctors order a lab test called a lipid profile (sometimes called a lipid panel), they are looking for information about the amounts of four types of fats in the blood. You will be asked to give a small sample of blood from your arm. The results can help your doctor evaluate your risk for heart disease.

What tests are included in a lipid profile?

The lipid profile includes total cholesterol, HDL-cholesterol (often called good cholesterol), LDL-cholesterol (often called bad cholesterol), and triglycerides.

Sometimes the report will include additional calculated values such as the Cholesterol/HDL ratio or a risk score based on lipid profile results, age, sex, and other risk factors.

Cholesterol helps the body form hormones, vitamin D and other important substances, but too much of it in the blood can clog and damage the blood vessels. Because it is a fat-like substance that doesn't mix with blood, cholesterol has to combine with proteins to form lipoproteins. Lipoproteins can travel in the blood to all the organs and tissues of the body.

Low-density lipoproteins (LDLs, or "bad" cholesterol) build up in the blood and increase your risk of heart disease.

High-density lipoproteins (HDLs, or "good" cholesterol) carry cholesterol to the liver, where it is removed from the body.

Triglycerides store energy for your body to use when it is needed. If there is too much, it can block blood vessels and cause other health problems such as abdominal pain and pancreatitis.

How is a lipid profile used?

The lipid profile is used to guide providers in deciding how a person at risk should be treated. The results of the lipid profile are considered along with other known risk factors of heart disease to develop a plan of treatment and follow-up.

It's important to know that the ranges....

Total Cholesterol (lower is better)
Best = <200 mg/dL
Borderline high = 200-239 mg/dL
High = 240 mg/dL or higher

Triglycerides (lower is better)
Best = <150 mg/dL
Borderline high = 150-199 mg/dL
High = 200-499 mg/dL
Very high = 500 mg/dl or higher

LDL Cholesterol (lower is better)
Best = <100 mg/dL
Good = 100-129 mg/dL
Borderline high = 130-159 mg/dL
High = 160-189 mg/dL
Very high = 190 mg/dL or higher

HDL Cholesterol (higher is better)
Low = <40 mg/dL
Best = 60 mg/dL or higher

If you only know Total Cholesterol, Triacylglycerol, and HDL levels -

LDL levels can be estimated:

LDL = TC - TG/5 - HDL