Medical Investigation


Diabetes

Diabetes Mellitus

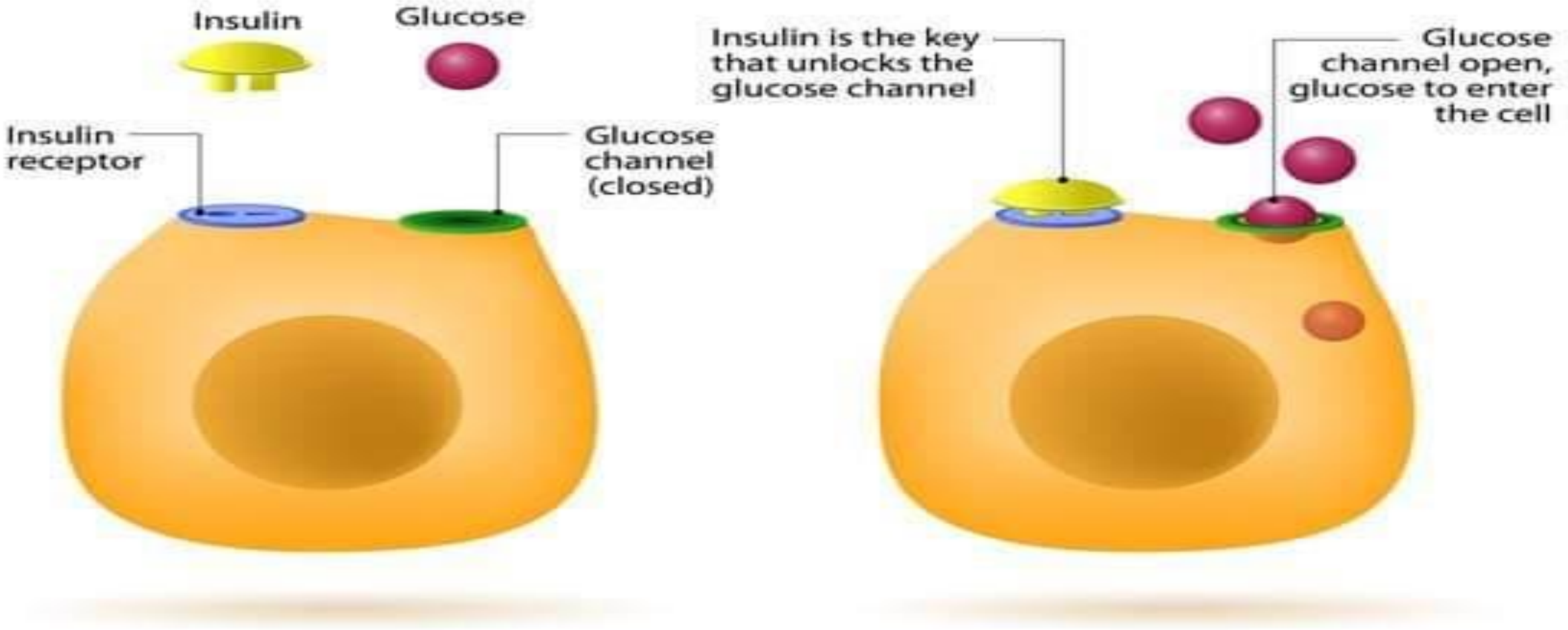
Definition

- Diabetes is a group of conditions linked by an inability to produce enough insulin and/or to respond to insulin. This causes high blood glucose levels (hyperglycemia) and can lead to a number of acute and chronic health problems, some of them life-threatening.

There are two types of mutually antagonistic metabolic hormones affecting blood glucose!!

- **Catabolic hormones** which increase blood glucose. (glucagon, growth hormone, cortisol)
- **Anabolic hormone** which decreases blood glucose. (insulin)

HOW DOES INSULIN WORK?



Types of diabetes

Type of Diabetes	Description
Type 1	Exact cause unknown; thought to be primarily an autoimmune disease that involves the destruction of the insulin-producing beta cells in the pancreas; can occur at any age but usually diagnosed in children and young adults.
Type 2	Most common type; associated with insulin resistance and with insulin production that is insufficient to meet the body's needs and to compensate for resistance. It develops most frequently in overweight middle-aged and elderly people. With increased obesity in children and adolescents, the condition is becoming more common at younger ages.
Gestational (pregnant)	Develops during a woman's pregnancy and affects both mother and developing baby; typically develops late in the pregnancy.
Prediabetes	Higher blood glucose than normal, but not considered diabetes; people with prediabetes are at an increased risk of developing diabetes.
Other	A group of less common types of diabetes. Any condition that damages the pancreas and/or affects insulin production or usage can cause diabetes.

Hyperglycemia

- high blood sugar is a condition in which an excessive amount of glucose circulates in the blood plasma.

Hypoglycemia

- Hypoglycemia is currently defined as a blood glucose value of less than 50 mg/dl. Clinically

Diabetes Mellitus

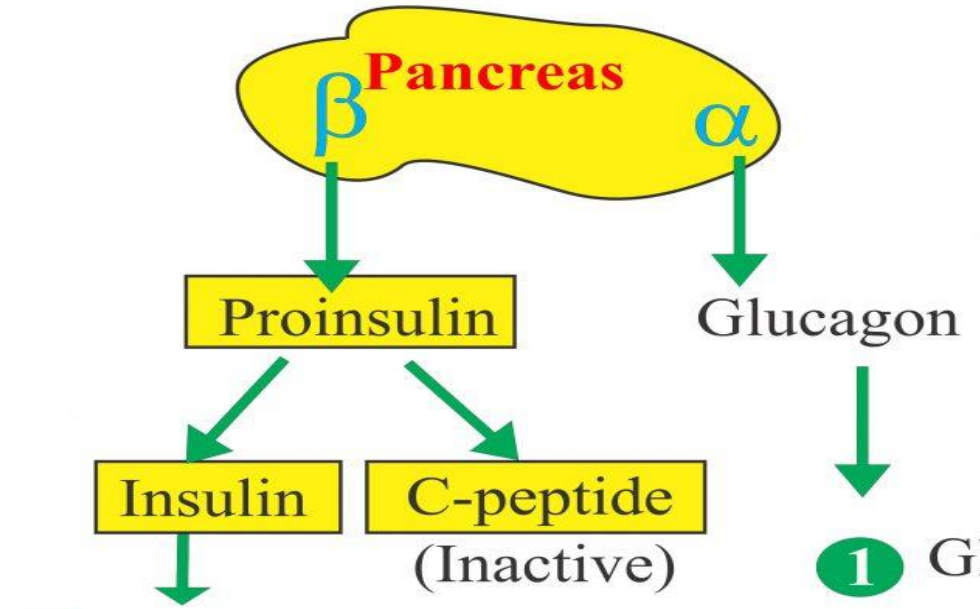
Diabetes mellitus

- Diabetes mellitus is impaired insulin secretion and variable degrees of peripheral insulin resistance leading to hyperglycemia.
- Early symptoms are related to hyperglycemia and include polydipsia, polyphagia, and polyuria.
- Later complications include vascular disease, peripheral neuropathy, and predisposition to infection.
- Diagnosis is by measuring plasma glucose.

Symptoms and Signs

- Increased thirst
- Increased urination
- Increased appetite (with type 1, weight loss is also seen)
- Fatigue
- Nausea, vomiting, abdominal pain (especially in children)
- Blurred vision
- Slow-healing wounds or infections
- Numbness, tingling, and pain in the feet (neuropathy)
- Erectile dysfunction in men
- Absence of menstruation in women
- Rapid breathing (acute)
- Decreased consciousness, coma (acute)

Insulin



1. Glycogenesis
2. Lipogenesis
3. Glycolysis
4. Inhibit glycogenolysis

1. Glycogenolysis
2. Gluconeogenesis

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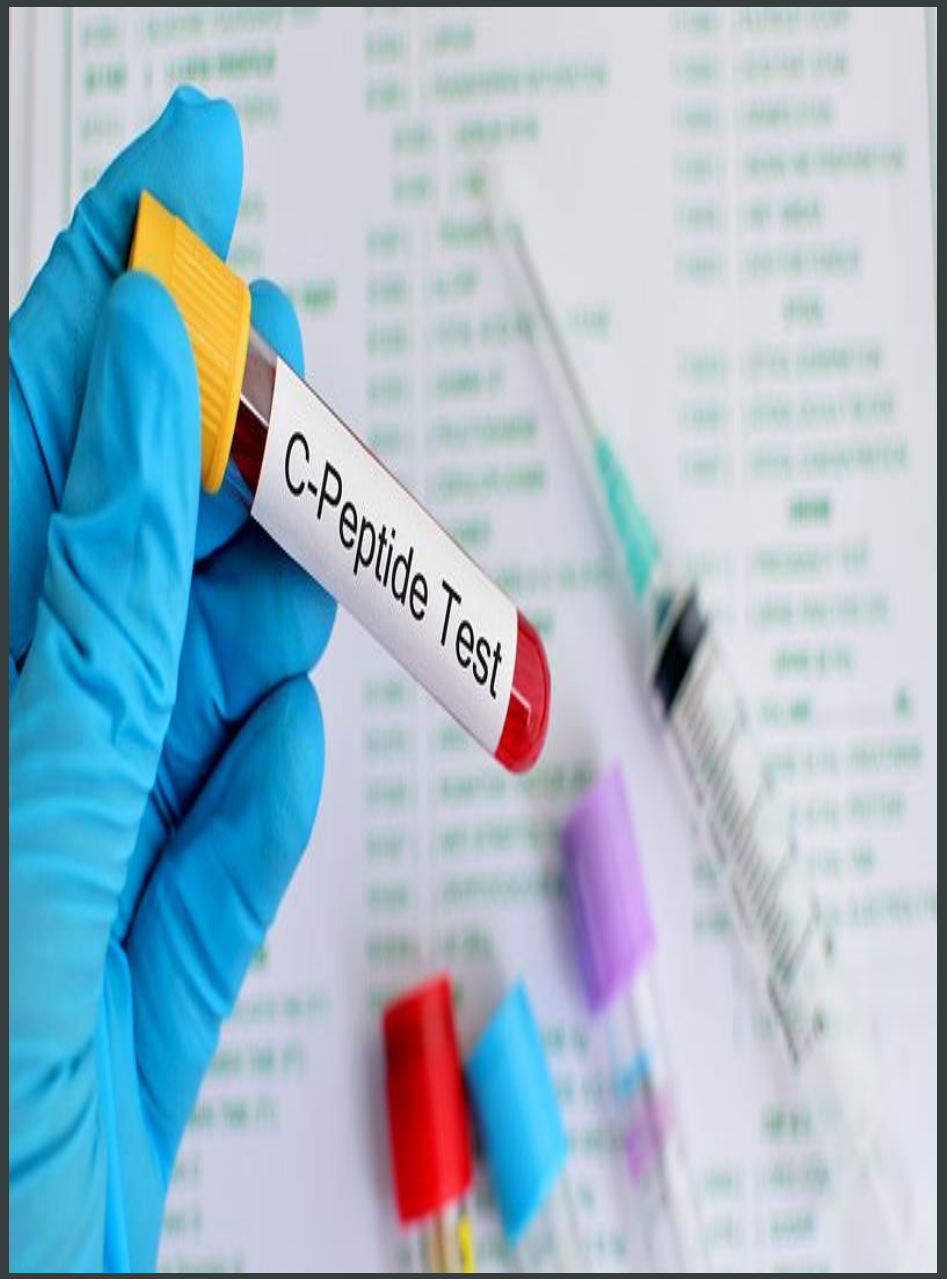
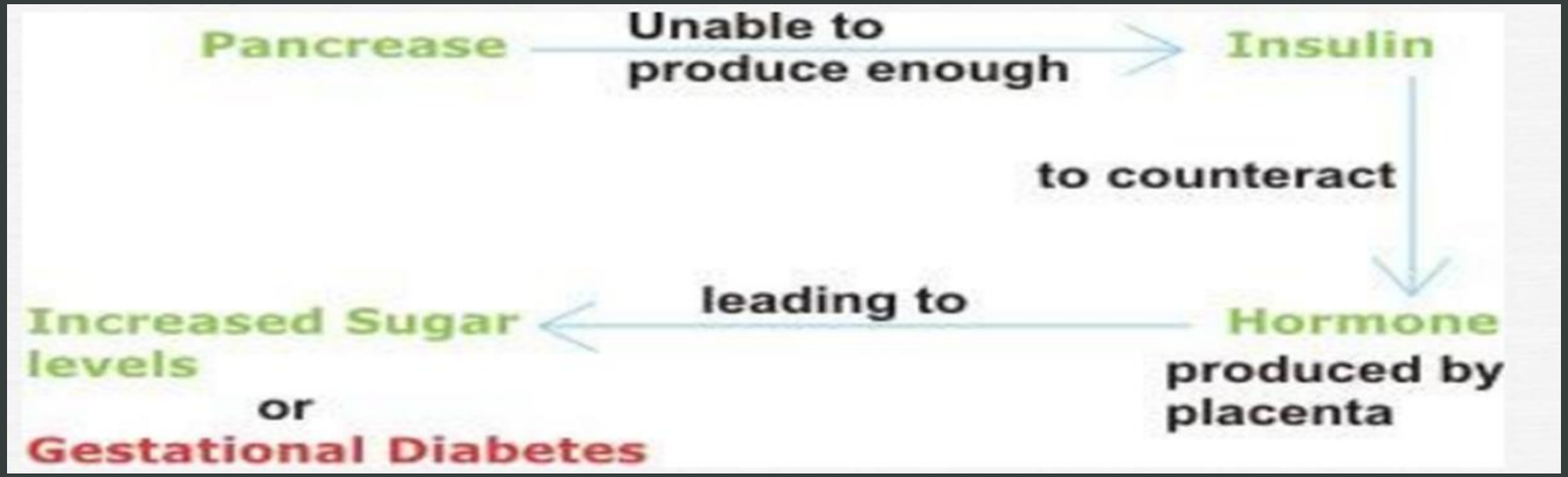


Gestational diabetes

Gestational diabetes

- Gestational diabetes is diabetes that is found for the first time when a woman is pregnant.



DIABETES MELLITUS

VERSUS

DIABETES INSIPIDUS

DIABETES MELLITUS	DIABETES INSIPIDUS
Diabetes mellitus is a group of metabolic diseases characterized by excessive levels of the sugar glucose in the blood	Diabetes insipidus is a condition characterized by excessive thirst and excretion of large amounts of severely dilute urine
Commonly caused by a deficiency of the pancreatic hormone insulin, which results in a failure to metabolize sugars and starch	Commonly caused by a deficiency of the pituitary hormone vasopressin, which regulates kidney function
Urine contains glucose	Urine doesn't contain glucose

Diabetes Insipidus

Sodium
Urine: Dilute

Sodium
Serum: Concentrated

Central

Decreased secretion of ADH

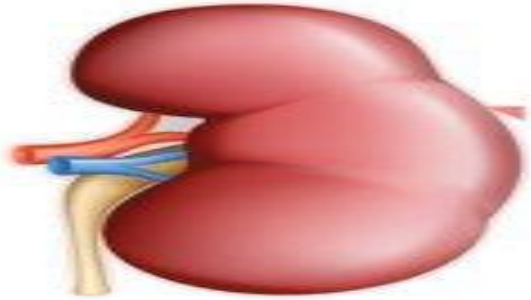
Pituitary gland

Antidiuretic hormone (ADH)

Causes
- Idiopathic
- Head trauma
- Pituitary tumor
- Neurosurgery

Nephrogenic

Kidney Resistance to ADH



Antidiuretic hormone (ADH)

Causes
- Lithium toxicity
- Renal disease
- Hypokalemia
- Pregnancy
- Medications

Blood glucose test

Overview

- Blood sugar concentration, or glucose level, refers to the amount of glucose present in the blood of a human. Normally, in mammals the blood glucose level is maintained at a reference range between about 70 and 120 mg/dl

Why Blood glucose test ?!

- To determine if your blood glucose level is within healthy ranges
- To screen for, diagnose, and monitor hyperglycemia, hypoglycemia, diabetes, and pre-diabetes
- To screen for gestational diabetes during pregnancy

Sample

- Plasma (Sodium Fluoride)

types

1- Fasting blood sugar (FBS)

measures blood glucose after you have not eaten for at least 8 hours. It often is the first test done to check for diabetes.

2- hour postprandial blood sugar

Measure blood glucose exactly 2 hours after you eat a meal.

3- Random blood sugar (RBS)

measures blood glucose regardless of when you last ate.
Several random measurements may be taken throughout the day. Random testing is useful because glucose levels in healthy people do not vary widely throughout the day. Blood glucose levels that vary widely may indicate a problem.

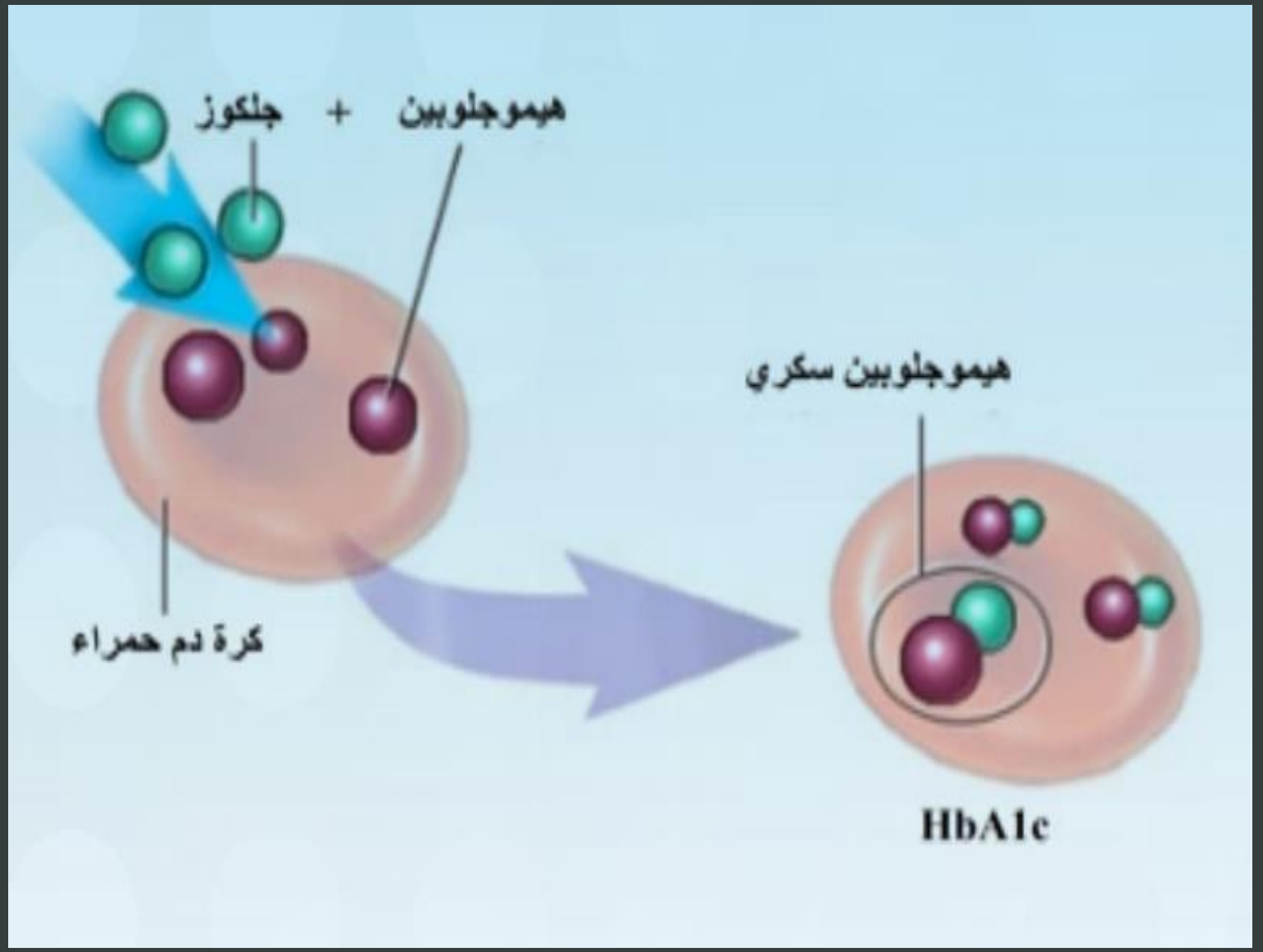
Procedure:

	Blank	Standard	Test
Reagent	1 ml	1 ml	1 ml
Standard	…….	10 ul	…….
Sample	…….	…….	10 ul
Incubate at 37 degree for 10 min then read absorbance against blank at wave length **520 nm**			
Calculation: sample concentration = (Absorbance of test / Absorbance of standard) X 100			

Normal:

Fasting glucose Level	Indication
From 70 to 99 mg/dl	Normal fasting glucose
From 100 to 125 mg/dl	(pre-diabetes)
126 mg/dl and above on more than one testing occasion	Diabetes

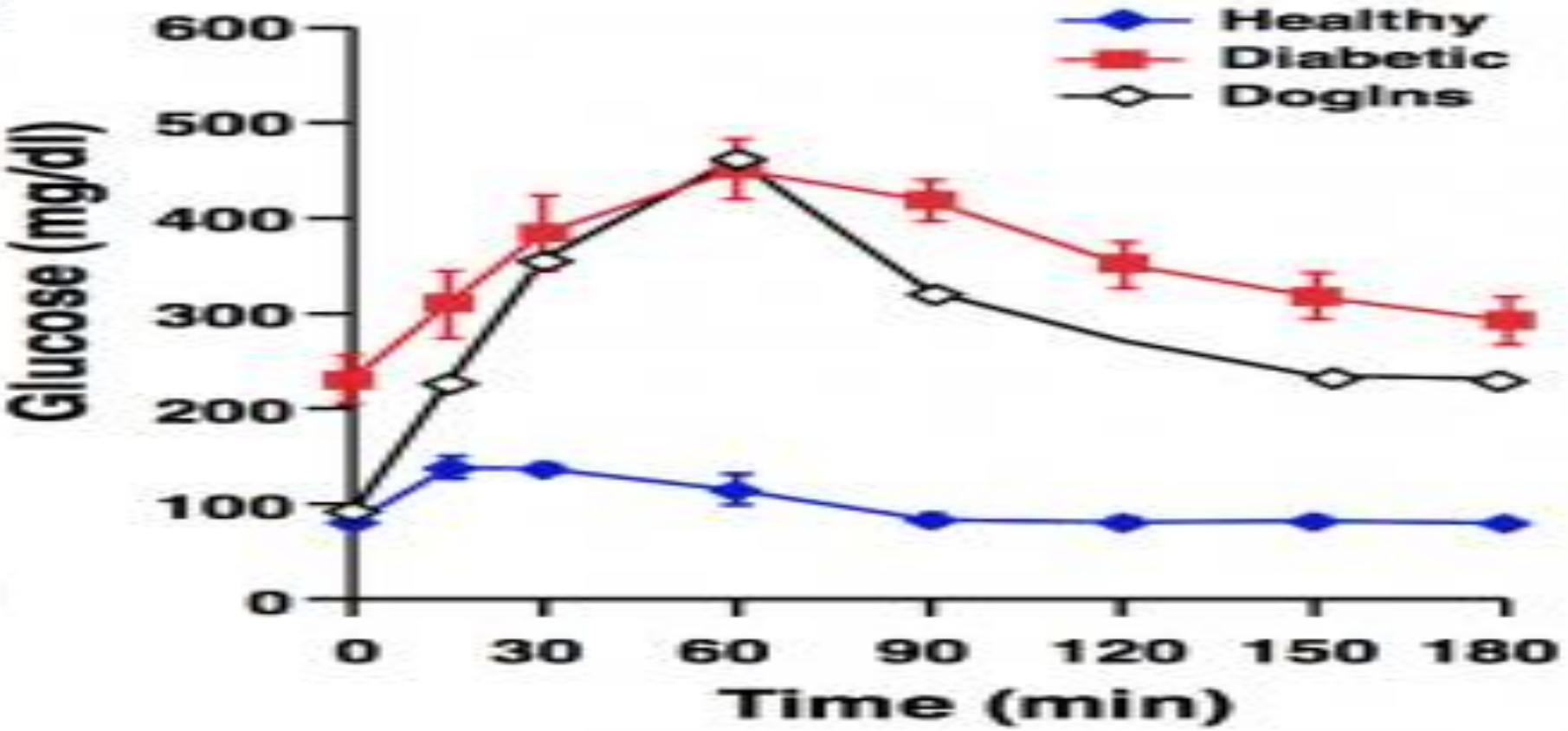
HbA1c


جلكوز
+
هيموجلوبين
كرة دم حمراء
هيموجلوبين سكري
HbA1c

هيموجلوبين سكري HbA1c	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9
جلوكوز (ملجم/ديسيلتر)	136	140	143	147	151	154	158	161	165	168

هيموجلوبين سكري HbA1c	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9
جلوكوز (ملجم/ديسيلتر)	207	211	215	218	222	225	229	232	236	240

Oral glucose tolerance test



That’s all for today ☺

Thanks for attention