

Republic of Iraq

Ministry of Higher Education for Sciences

Al- Zahra University for Women

College of Health and Medical Technologies

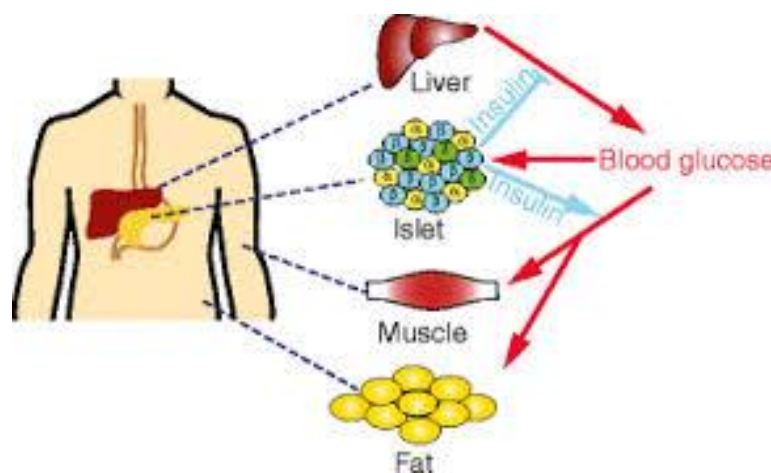
Department of Anesthesia Techniques



CHEMISTRY

Title of the lecture:

Glucose abnormalities, diabetes mellitus, ketosis, glycosuria, glucose tolerance curve.



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Glucose Disorders

Glucose disorders refer to any disruption in the regulation of blood glucose levels, which serve as the body's primary energy source. These disorders occur due to issues with the production or utilization of insulin, the hormone responsible for managing blood sugar levels.

Types of Glucose Disorders

1

Hyperglycemia

Definition: Abnormally high blood glucose levels.

• **Causes:**

- Insufficient or absent insulin production.
- Cellular resistance to insulin (as seen in type 2 diabetes).
- Stress or other conditions like infections.

Symptoms

- Excessive thirst.
- Frequent urination.
- Fatigue. • Blurred vision.

Complications: If left untreated, it can lead to long-term issues such as heart disease, kidney damage, and nerve damage.

2

Hypoglycemia

Definition: Abnormally low blood glucose levels.

• **Causes:**

- Overuse of insulin.
- Skipping meals or inadequate nutrition.
- Excessive physical activity without proper food compensation.

Symptoms:

- Sweating.
- Trembling.
- Headache.
- Difficulty concentrating.

• **Complications:** If untreated, it can lead to unconsciousness or brain damage.

General Causes of Glucose Disorders

•Pancreatic issues: Such as chronic inflammation or tumors.

• Cellular insulin receptor dysfunction: Leading to insulin resistance.

Hormonal imbalances: • Like increased cortisol or adrenaline levels, which counteract insulin action.

Diagnosis

• Glucose disorders are diagnosed using tests like

• Fasting blood sugar test.

• Oral glucose tolerance test.

• Hemoglobin A1c (HbA1c) test.

Treatment

Treatment depends on the type of glucose disorder

Hyperglycemia

Medications like insulin or oral antidiabetic drugs, combined with lifestyle changes.

Hypoglycemia

Consuming sugar-rich foods or drinks quickly (e.g., fruit juice).

Diabetes Mellitus

Diabetes mellitus is a chronic medical condition characterized by high blood glucose (sugar) levels due to problems with insulin production, action, or both. Insulin, a hormone produced by the pancreas, plays a key role in allowing glucose to enter cells for energy.

Types of Diabetes

1

Type 1 Diabetes

- **Definition:** An autoimmune condition where the immune system attacks insulin-producing beta cells in the pancreas, leading to little or no insulin production.

- **Onset:** Commonly diagnosed in childhood or adolescence but can occur at any age.

- **Management:** Requires daily insulin injections or the use of an insulin pump

2

Type 2 Diabetes

- **Definition:** A condition where the body becomes resistant to insulin or does not produce enough insulin.

- **Onset:** Typically occurs in adults, but increasing cases are seen in children due to lifestyle factors.

- **Risk Factors:** Obesity, sedentary lifestyle, genetic predisposition, and poor dietary habits.

- **Management:** Lifestyle changes (diet, exercise), oral medications, and sometimes insulin therapy.

3

Gestational Diabetes

- **Definition:** A type of diabetes that develops during pregnancy and usually resolves after childbirth.

- **Risk Factors:** Family history of diabetes, obesity, or previous large birth weight babies.

- **Complications:** Can increase the risk of type 2 diabetes later in life for both mother and child.

Symptoms of Diabetes

1

Increased thirst and hunger.

2

Frequent urination, especially at night

3

Fatigue and weakness

4

Unexplained weight loss

5

Blurred vision.
Slow healing of wounds.

Complications

If uncontrolled, diabetes can lead to:

Acute complications:

- Diabetic ketoacidosis (DKA): A life-threatening condition in type 1 diabetes caused by a lack of insulin.
- Hyperosmolar hyperglycemic state (HHS): Severe hyperglycemia, usually in type 2 diabetes.

Chronic complications:

- Cardiovascular diseases (heart attacks, strokes).
- Kidney damage (diabetic nephropathy).
- Eye damage (diabetic retinopathy, leading to blindness).

Diagnosis

Fasting blood sugar: Measures glucose after an overnight fast.

Oral glucose tolerance test (OGTT): Evaluates how the body processes glucose after a sugary drink.

HbA1c test: Measures average blood sugar levels over 2-3 months.

Treatment

1

- Type 1 Diabetes:**
- Daily insulin injections or an insulin pump.
 - Continuous glucose monitoring (CGM) for better control.

2

- Type 2 Diabetes:**
- Lifestyle modifications:
 - Balanced diet with reduced sugar and refined carbs. Regular exercise. Weight loss.
- Medications: Oral antidiabetics (e.g., metformin) or insulin if needed.

3

- Gestational Diabetes:**
- Dietary management.
 - Insulin therapy if blood sugar is not controlled by diet alone.

Prevention and Management

1

Maintain a healthy weight.

2

Follow a balanced diet rich in fiber and low in sugar.

3

Engage in regular physical activity.

4

Monitor blood sugar levels regularly

5

Avoid smoking and limit alcohol consumption.

Ketosis

A condition that occurs when the body starts using fat as the primary energy source instead of glucose, leading to the production of ketone bodies in the liver.

Causes

Prolonged fasting.

Following a low-carbohydrate diet.

Type 1 diabetes when insulin levels are very low.

Symptoms

1

Loss of appetite.

2

Fatigue.

3

Fruity-smelling breath

Significance:

Ketosis can be beneficial in some cases, such as weight loss or as an adjunct treatment for conditions like epilepsy, but it can become dangerous if it develops into diabetic ketoacidosis.

Glycosuria

The presence of glucose in urine, which indicates that blood sugar levels have exceeded the kidney's reabsorption capacity.

Causes

Pregnancy (sometimes due to changes in kidney function).

Kidney or urinary tract disorders.

Diabetes (especially when untreated).

Associated Symptom

1

Frequent urination.

2

Excessive thirst.

3

Fatigue

Diagnosis:

Typically detected through urine analysis revealing glucose presence.