

HYPOGLYCEMIA

Hypoglycemia is a condition where blood glucose levels fall below the normal range, typically **< 70 mg/dL (3.9 mmol/L)**. It can be life-threatening if not treated promptly, leading to seizures, loss of consciousness, or even death.

1. CAUSES OF HYPOGLYCEMIA

Hypoglycemia can result from multiple conditions, broadly classified into **exogenous, endogenous, and other causes**.

A. Exogenous Causes (Most Common)

1. Diabetes Treatment

- Excess **insulin** (accidental overdose or miscalculated dose)
- **Sulfonylureas** (e.g., glipizide, glyburide)
- **Meglitinides** (e.g., repaglinide)

2. Alcohol Consumption

- Alcohol **inhibits gluconeogenesis**, leading to hypoglycemia, especially in fasting states.

3. Prolonged Fasting or Starvation

- Lack of food intake leads to depletion of glycogen stores.

4. Intensive Physical Activity

- Excessive exercise without sufficient carbohydrate intake.

B. Endogenous Causes

1. Insulinoma (Pancreatic Tumor Producing Insulin)

- Rare but important cause of recurrent hypoglycemia.
- Diagnosed with **high insulin and C-peptide despite low glucose**.

2. Adrenal Insufficiency (Addison's Disease)

- Cortisol deficiency impairs gluconeogenesis.

3. Hypopituitarism

- Reduced growth hormone and cortisol secretion.

4. Critical Illness (Sepsis, Liver Failure)

- Impaired glucose production due to liver dysfunction.

5. Reactive (Postprandial) Hypoglycemia

- Occurs 2–4 hours after a meal due to excessive insulin secretion.

C. Other Causes

- **Gastrointestinal Surgery (Dumping Syndrome)**
 - **Factitious Hypoglycemia (Self-administration of Insulin or Sulfonylureas)**
 - **Glycogen Storage Diseases**
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2. SIGNS & SYMPTOMS

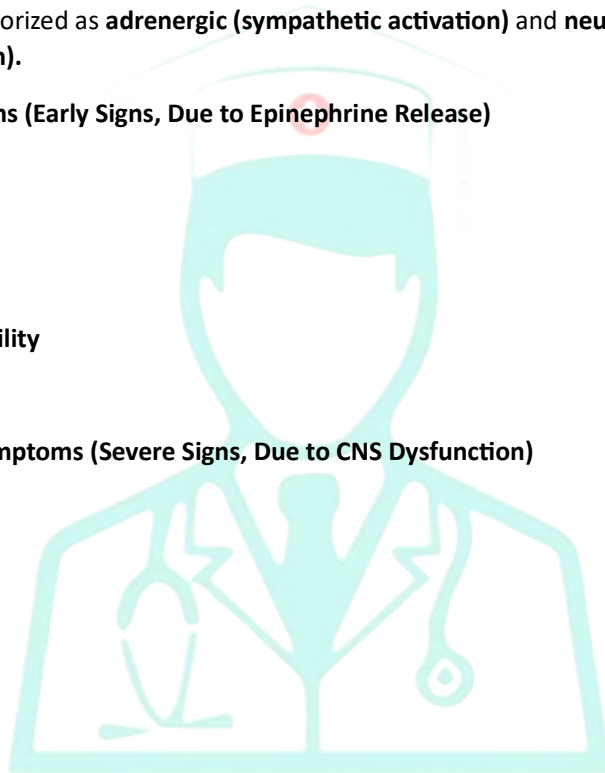
Symptoms can be categorized as **adrenergic (sympathetic activation)** and **neuroglycopenic (glucose deprivation in the brain)**.

A. Adrenergic Symptoms (Early Signs, Due to Epinephrine Release)

- **Sweating**
- **Palpitations**
- **Tremors**
- **Anxiety/Irritability**
- **Hunger**

B. Neuroglycopenic Symptoms (Severe Signs, Due to CNS Dysfunction)

- **Confusion**
- **Drowsiness**
- **Blurred vision**
- **Slurred speech**
- **Seizures**
- **Loss of consciousness/coma**



3. INVESTIGATIONS

A. Laboratory Tests

1. **Blood Glucose (Random, Fasting, or During Symptoms)**
 - **< 70 mg/dL (3.9 mmol/L)** confirms hypoglycemia.
2. **Whipple's Triad (For True Hypoglycemia Diagnosis)**
 - Symptoms suggestive of hypoglycemia.
 - **Low plasma glucose (< 70 mg/dL)** at the time of symptoms.
 - Symptoms resolve after glucose administration.

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3. Serum Insulin & C-Peptide

- High insulin + high C-peptide → Insulinoma or Sulfonylurea use.
- High insulin + low C-peptide → Exogenous insulin overdose.

4. Serum Ketones

- Suppressed in insulin-mediated hypoglycemia (insulinoma, exogenous insulin).

5. Cortisol & Growth Hormone Levels

- Low in adrenal insufficiency or hypopituitarism.

6. Oral Glucose Tolerance Test (for Reactive Hypoglycemia)

B. Imaging

- CT/MRI Abdomen → Look for insulinoma.
 - Endoscopic Ultrasound (EUS) → More sensitive for pancreatic tumors.
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4. MANAGEMENT

A. Immediate Treatment (Emergency Cases)

1. Conscious Patient (Able to Swallow)

- Give 15–20g of Fast-Acting Carbohydrates:
 - Glucose tablets or gel
 - Fruit juice, regular soda, or candy
- Recheck blood glucose after 15 minutes; repeat if still < 70 mg/dL.

2. Unconscious or Unable to Swallow

- IV 50% Dextrose (D50) Push (25–50 mL)
- Glucagon 1 mg IM or SC (if IV access unavailable)
- Monitor blood glucose every 15–30 minutes

B. Long-Term Management

1. Diabetes-Related Hypoglycemia

- Adjust insulin/sulfonylurea doses.
- Educate on proper meal timing and carbohydrate intake.

2. Insulinoma or Factitious Hypoglycemia

- Surgical removal for insulinoma.
- Psychosocial assessment in suspected factitious cases.

3. Adrenal Insufficiency or Hypopituitarism

- Replace deficient hormones (e.g., **hydrocortisone, fludrocortisone**).

4. Reactive Hypoglycemia

- Small, frequent meals with **low glycemic index (GI) foods**.
- Avoid refined sugars and simple carbohydrates.

5. COMPLICATIONS

- Seizures
- Coma
- Brain Damage (Prolonged Hypoglycemia)
- Cardiac Arrhythmias (Severe Cases)

6. PREVENTION

- Frequent glucose monitoring (especially in diabetics)
 - Proper insulin dosing and timing with meals
 - Avoid excessive alcohol intake on an empty stomach
 - Dietary modifications in reactive hypoglycemia
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