Diabetes mellitus

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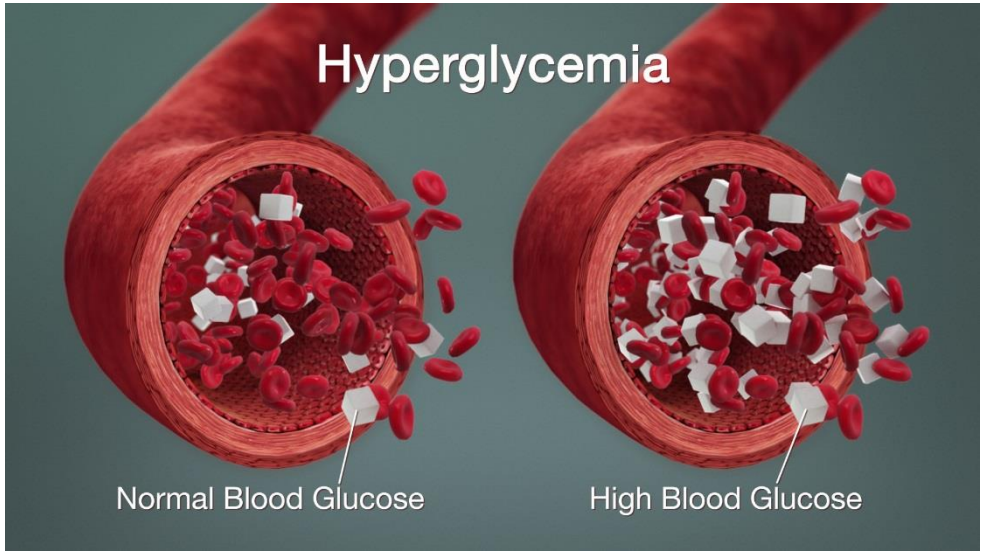
Intended learning outcomes

- Describe diabetes mellitus, its diagnosis and classification
- Illustration of case studies on Diabetes Mellitus

Hyperglycaemia

Hyperglycaemia may be due to:

- Intravenous infusion of glucose-containing fluids
- Severe stress (usually a transient effect) such as trauma, myocardial infarction or cerebrovascular accidents
- diabetes mellitus or impaired glucose regulation.



Diabetes mellitus

- **Diabetes mellitus** is a group of metabolic diseases characterized by high blood glucose levels – **Hyperglycaemia**.
- This results from defects in insulin secretion, action, or both.
- Normally, blood glucose levels are tightly controlled by **insulin**, a hormone produced by the β cells in the pancreas.

Diabetes mellitus

- In patients with diabetes mellitus, the absence or insufficient production of insulin causes hyperglycemia
- **If left untreated**, diabetes can cause many complications.
  - **Acute complications** can include diabetic ketoacidosis, nonketotic hyperosmolar coma, or death.
  - Serious **long-term complications** include heart disease, stroke, chronic kidney failure, foot ulcers, and damage to the eyes.

Diagnosis of DM

It can be diagnosed by demonstrating any one of the following:

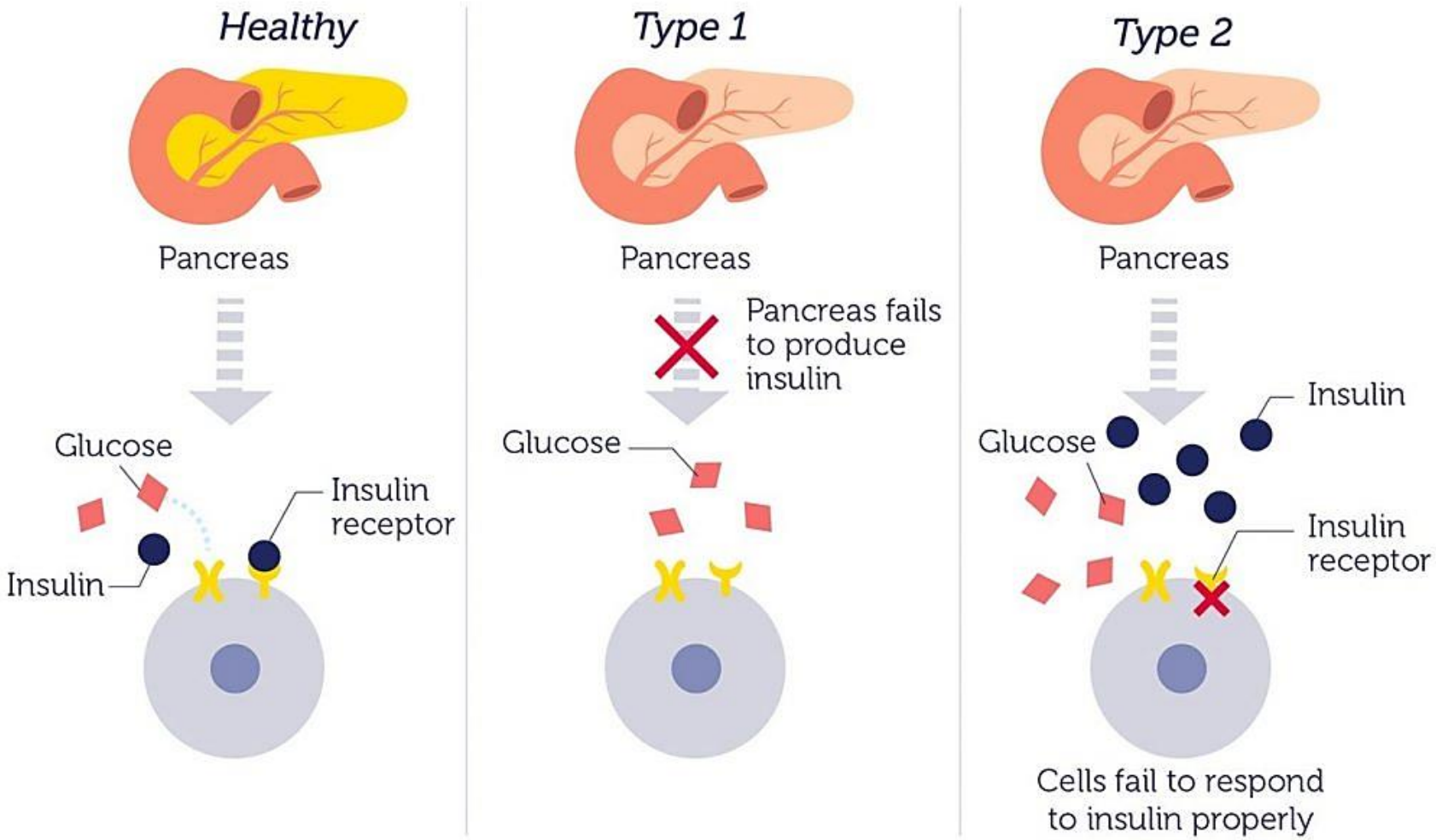
- ❑ **Fasting plasma glucose** level ≥ 7.0 mmol/l (126 mg/dl)
- ❑ **Plasma glucose** ≥ 11.1 mmol/l (200 mg/dl) two hours after a 75 g oral glucose load as in a **glucose tolerance test**.
- ❑ Symptoms of high blood sugar and casual plasma glucose ≥ 11.1 mmol/l (200 mg/dl)
- ❑ **Glycated hemoglobin** (HbA1C) ≥ 48 mmol/mol (≥ 6.5 %)

Classification of DM

- Diabetes is due to either the pancreas not producing enough insulin or the cells of the body not responding properly to the insulin produced
- There are **three main types** of diabetes mellitus:

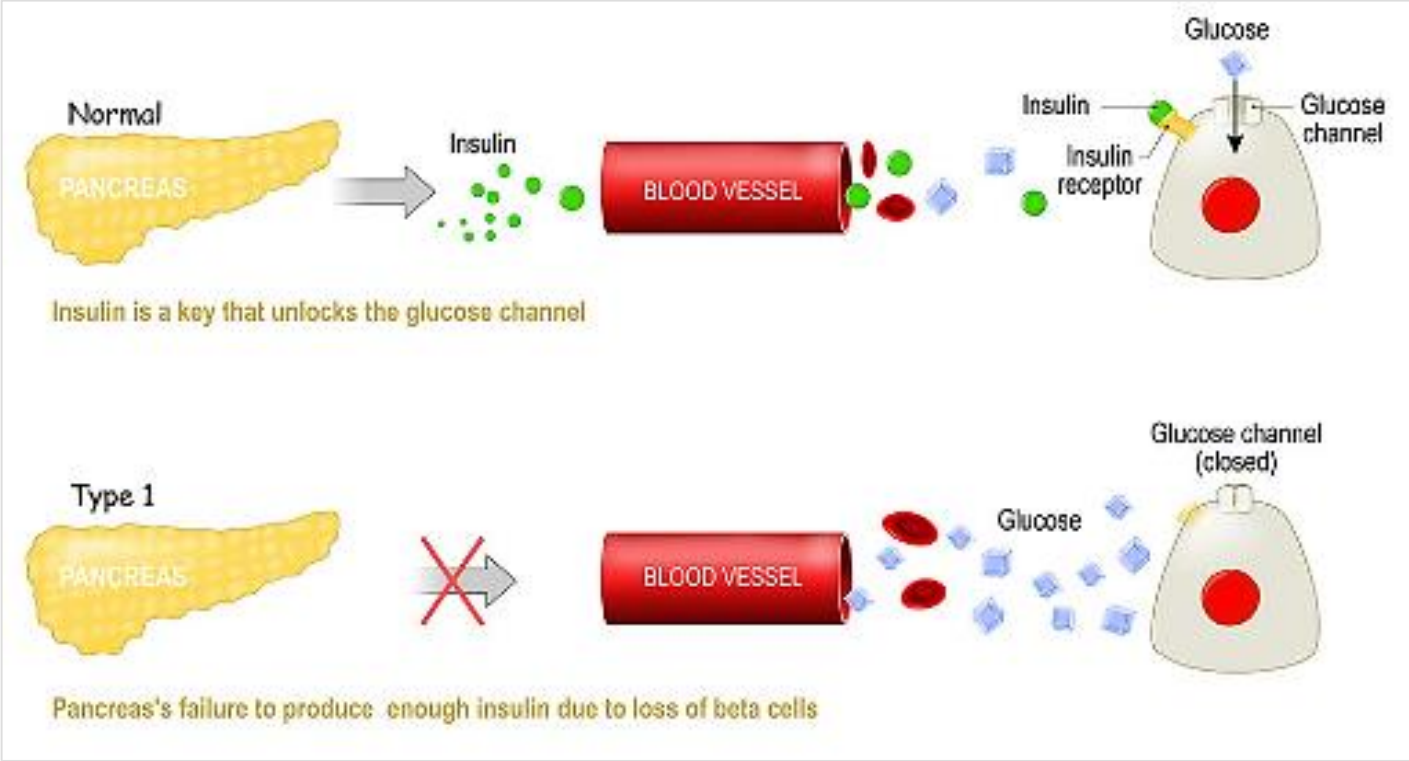
- Type 1 DM
- Type 2 DM
- Gestational Diabetes

Classification of DM



Type 1 DM

- Results from the pancreas's failure to produce enough insulin
- Previously called insulin-dependent diabetes mellitus
- It used to be called juvenile-onset diabetes, because it often begins in childhood

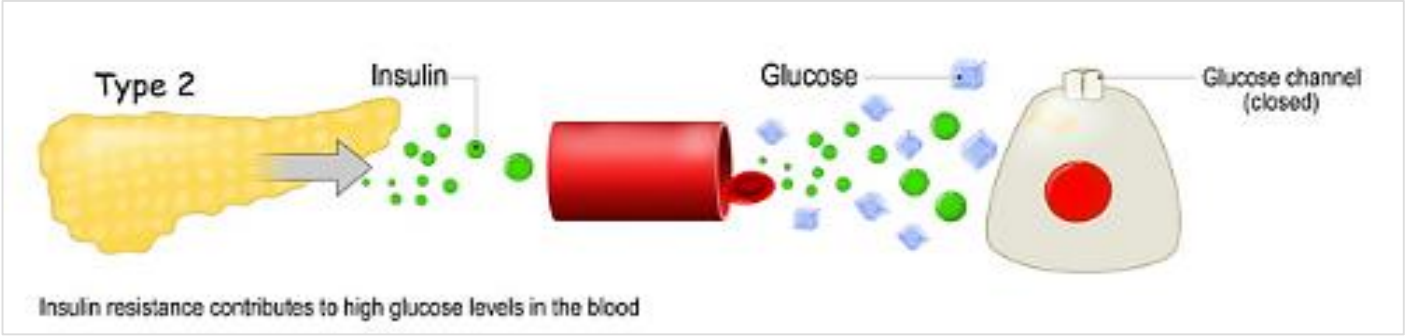


Signs and symptoms

- Polydipsia (Excessive thirst)
- Polyphagia (Extreme hunger)
- Unexplained weight loss
- Increased fatigue
- Irritability
- Blurry vision
- Frequent infections
- Dry, itchy skin
- Numbness or tingling in hands or feet

Type 2 DM

- The most common form of diabetes, accounting for 90% of diabetes cases
- Begins with insulin resistance, a condition in which cells fail to respond to insulin properly.
- This form was previously referred to as "non insulin- dependent diabetes mellitus" (NIDDM) or "adult-onset diabetes“
- The primary cause is excessive body weight and not enough exercise



Insulin resistance contributes to high glucose levels in the blood

Gestational Diabetes

- Is the third main form and occurs in pregnant women without a previous history of diabetes
- It is often diagnosed in middle or late pregnancy

Hypoglycaemia

- This is probably the most common cause of coma seen in diabetic patients
- Hypoglycaemia is most commonly caused by accidental overadministration of diabetes medications.
- The patient may have missed a meal or taken excessive exercise after the usual dose of insulin or oral hypoglycaemic drugs.

Case 1: Description

- 34-year-old woman with known type 1 diabetes mellitus was admitted to hospital following a ‘black out’ while driving.
- She had recently increased her insulin dose because she felt unwell with ‘flu’ but unwisely had missed two meals during the day

Results of laboratory tests

The results of some of her biochemistry tests were as follows: Plasma

Sodium 135 mmol/L (135–145)

Potassium 4.0 mmol/L (3.5–5.0)

Bicarbonate 23 mmol/L (24–32)

Urea 5.4 mmol/L (2.5–7.0)

Creatinine 100 µmol/L (70–110)

Glucose 1.5 mmol/L (5.5–11.1)

pH 7.43 (7.35–7.45)

PaCO2 5.3 kPa (4.6–6.0) and PaO2 12.1 kPa (9.3–13.3)

Discussion of case 1

a) The blood glucose shows **hypoglycaemia**, secondary to the patient having increased her insulin dose despite having missed meals.

b) Hypoglycaemia can present with neurological impairment, including impaired memory, loss of consciousness and coma.

Treatment

- This can be treated in the emergency situation by giving glucose intravenously to avoid irreversible neurological damage.
- It is important for patients on insulin to monitor their own blood glucose closely, particularly if they wish to drive.

Case 2: Description

- A 24-year-old woman presented to the casualty department in a coma

Results of laboratory tests

The relevant biochemical results were as follows: Plasma

Sodium 130 mmol/L (135–145)

Potassium 5.9 mmol/L (3.5–5.0)

Bicarbonate 10 mmol/L (24–32)

Chloride 92 mmol/L (95–105)

Glucose 35 mmol/L (5.5–11.1)

pH 7.10 (7.35–7.45)

PaCO2 3.1 kPa (4.6–6.0) and PaO2 11.1 kPa (9.3–13.3)

Urine was positive for ketones.

Discussion of case 2

The patient was shown to have Type 1 diabetes mellitus and had presented in diabetic ketoacidosis, with hyperglycaemia, hyponatraemia, hyperkalaemia and a metabolic acidosis

THANK YOU !

ANY QUESTIONS ??

PLEASE ASK