

This is the **Foundation Separate** version — Higher Tier content has been removed.

Blood glucose concentration must be maintained within a narrow range to supply cells with energy while preventing damage from high glucose levels.

- Normal blood glucose: ~4–8 mmol/L (varies with meals and exercise).
- The PANCREAS monitors blood glucose and acts as the control centre.
- Blood glucose rises (e.g. after eating): beta cells in pancreas secrete INSULIN → cells take up glucose; liver converts glucose to GLYCOGEN (glycogenesis) → blood glucose falls.
- Blood glucose falls (e.g. during exercise): alpha cells in pancreas secrete GLUCAGON → liver breaks glycogen back to glucose (glycogenolysis) → blood glucose rises.
- This is negative feedback: the response opposes the change, restoring the set point.
- Type 1 diabetes: autoimmune — immune system destroys beta cells → no insulin produced → blood glucose stays high (hyperglycaemia). Treated with insulin injections.
- Type 2 diabetes: body cells become RESISTANT to insulin (do not respond to it) → glucose stays in blood. Linked to obesity/poor diet. Managed with diet, exercise and medication.

Key Terms

Insulin	Hormone from pancreatic beta cells — lowers blood glucose by stimulating glucose uptake and glycogen synthesis
Glucagon	Hormone from pancreatic alpha cells — raises blood glucose by stimulating glycogen breakdown
Glycogen	The storage form of glucose — insoluble polysaccharide stored in liver and muscles
Glycogenesis	Conversion of glucose to glycogen for storage (when blood glucose is high)
Type 1 diabetes	No insulin produced — autoimmune destruction of beta cells — requires insulin injections
Type 2 diabetes	Cells resistant to insulin — linked to obesity — managed with lifestyle changes

■ **Exam Tip:** A common mistake: saying insulin "destroys" glucose. Insulin causes glucose to be taken UP by cells and converted to GLYCOGEN — it does not destroy glucose. Similarly, glucagon does not make new glucose — it converts stored glycogen back to glucose.