The Control of Glucose Key Information

When blood glucose levels rise, such as after eating, beta cells in the pancreas detect this increase through glucose transporters (GLUT2) on their surface. Glucose enters the beta cells and undergoes metabolism via glycolysis and the citric acid cycle, resulting in the production of ATP. The rise in ATP/ADP ratio closes ATP-sensitive potassium channels in the cell membrane, causing depolarization. This change in electrical charge opens voltage-gated calcium channels, allowing calcium ions to flow into the beta cell. The influx of calcium triggers vesicles containing insulin to fuse with the cell membrane, releasing insulin into the bloodstream by exocytosis. Insulin then travels to target tissues, promoting glucose uptake and restoring normal blood glucose levels.

Key words & definitions

Key word	Key information
Beta (β) cells	Cells in the islets of Langerhans in the pancreas that secrete insulin.
Glucose transporter	A membrane protein that facilitates the movement of glucose across cell membranes.
ATP-sensitive potassium channels	Membrane channels that close when ATP levels rise, affecting the cell's electrical charge.
Depolarization	A change in membrane potential where the inside of the cell becomes less negative.
Voltage-gated calcium channels	Membrane proteins that open in response to depolarization, allowing calcium ions to enter the cell.
Vesicles	Small membrane-bound sacs that store and transport substances within cells.
Exocytosis	The process by which vesicles fuse with the cell membrane to release their contents outside the cell.