

Insulin and Glucagon

Understanding:

- Insulin and glucagon are released by β and α cells of the pancreas to control blood glucose concentration

The body needs glucose to make ATP (via cell respiration), however the amount required will fluctuate according to demand

High levels of glucose in the blood can damage cells (creates hypertonicity) and hence glucose levels must be regulated

Two antagonistic hormones are responsible for regulating blood glucose concentrations – insulin and glucagon

These hormones are released from pancreatic pits (called the islets of Langerhans) and act principally on the liver

When blood glucose levels are high (e.g. after feeding):

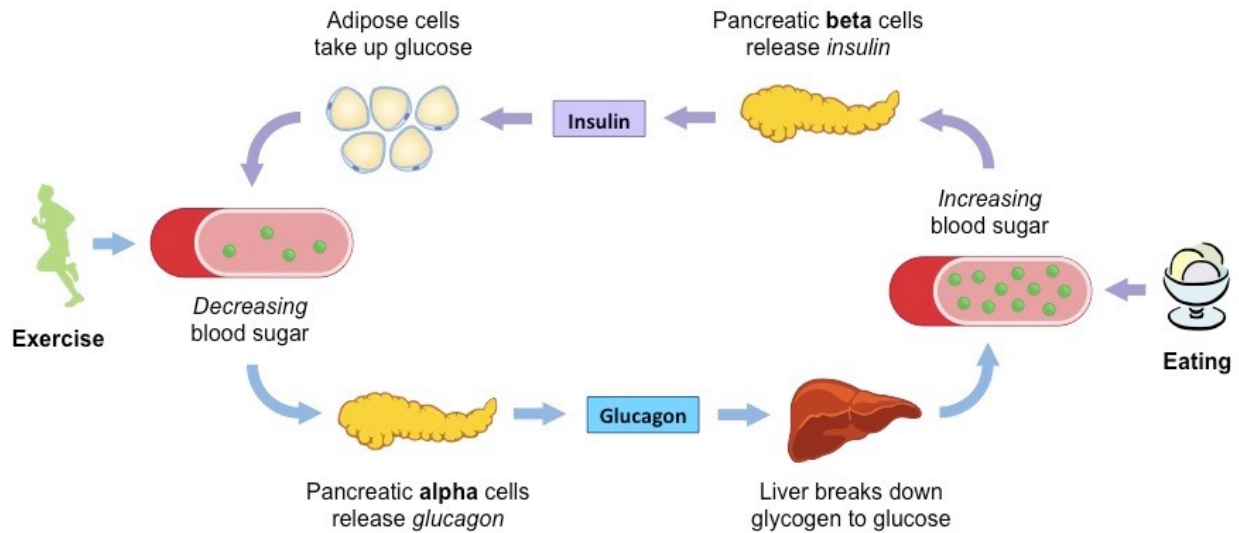
Insulin is released from beta (β) cells of the pancreas and cause a decrease in blood glucose concentration

This may involve stimulating glycogen synthesis in the liver (glycogenesis), promoting glucose uptake by the liver and adipose tissue, or increasing the rate of glucose breakdown (by increasing cell respiration rates)

When blood glucose levels are low (e.g. after exercise):

Glucagon is released from alpha (α) cells of the pancreas and cause an increase in blood glucose concentration

This may involve stimulating glycogen breakdown in the liver (glycogenolysis), promoting glucose release by the liver and adipose tissue, or decreasing the rate of glucose breakdown (by reducing cell respiration rates)



Application:

- Causes and treatment of Type I and Type II diabetes

Diabetes mellitus is a metabolic disorder that results from a high blood glucose concentration over a prolonged period

It is caused by the body either not producing insulin (Type I) or failing to respond to insulin production (Type II)

It is treated with either insulin injections (Type I only) or by carefully monitoring and controlling dietary intake (Type II)

Type I Insulin-Dependent Diabetes Mellitus (IDDM)	Type II Non Insulin Dependent Diabetes Mellitus (NIDDM)
Usually occurs during childhood (early onset)	Usually occurs during adulthood (late onset)
Body does not <i>produce</i> sufficient insulin	Body does not <i>respond</i> to insulin production
Caused by the destruction of β -cells (autoimmune)	Caused by the down-regulation of insulin receptors
Requires insulin injections to regulate blood glucose	Controlled by managing diet and lifestyle

Type I vs Type II Diabetes

