

Glucagon and insulin: prime regulators of glucose homeostasis:

- Increased plasma [glucose] → increased [insulin] → reduced plasma [glucose] → increased [glucagon] → increased [glucose]
- Increased plasma glucose levels signals insulin secretion and suppression of glucagon secretion

Glucagon and insulin: counter-regulatory function

- Insulin: reduces blood glucose
- Glucagon: increases blood glucose

Glucose

Glucose: located in the liver, skeletal muscle, adipose tissue, pancreas, in circulation

Hypoglycemia: drowsy, aggression, irritability, loss of consciousness

Glucose sources for glycogen synthesis:

- 10-15% glucose absorbed and converted to pyruvate
- 40-60% glucose converted to G6P to be stored as glycogene
- 30-40% used peripherally

Insulin

Properties:

- Water soluble
- Synthesized as very long pre-pro-insulin and then spliced into pro-insulin; C-peptide holds two parts of molecule together via S=S bridges; these are cleaved to give C-peptide and insulin molecule
- MW: 5808Da
- Insulin gene located on Chromosome 11
- Half life = 5mins
- 80% degraded in the liver and kidneys (if problem with these tissues then get an accumulation of insulin)

Rapid action of insulin (seconds)

- Increased uptake of glucose, AA and K⁺ uptake into insulin-sensitive cells (adipose tissue and muscle cells)

Intermediate action of insulin (minutes)

- Stimulate protein synthesis
- Inhibit protein degradation (muscle and liver)
- Activate glycogen synthase and glycolytic enzymes (liver)
- Inhibit phosphorylase and gluconeogenic enzymes (liver)

Delayed action of insulin (hours)

- Increased mRNA for lipogenic and other enzymes

Regulation of Insulin Release

Stimulators	Inhibitors
- Glucose - Amino acids - Glucagon - GIP - cAMP - beta adrenergics - sulphonylureas	- somatostatin - insulin - 2-deoxyglucose - alpha adrenergics - potassium depletion - beta blockers - thiazide diuretics