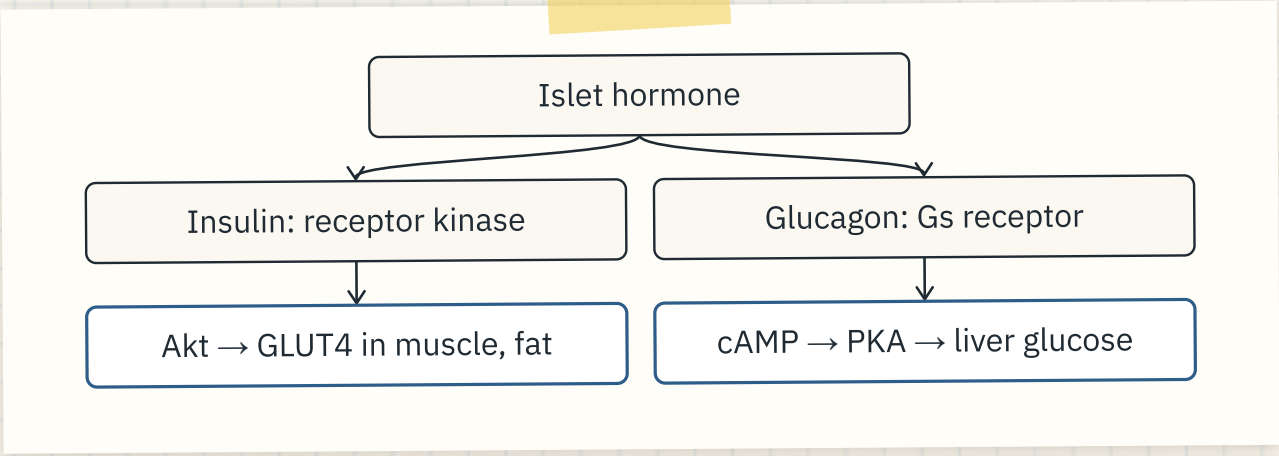
Insulin vs glucagon in 3 points

Receptors, signals and target tissues



Step by step

1. Insulin: tyrosine kinase, IRS, PI3K, PIP_3, Akt; GLUT4 in muscle and fat.
2. Glucagon: Gs, adenylyl cyclase, cAMP, PKA; acts on the liver.
3. The insulin to glucagon ratio sets fed or fasting metabolism.

	Insulin	Glucagon
Islet cell	Beta	Alpha
Receptor	Tyrosine kinase	7-transmembrane, Gs
Signal	IRS → PI3K → PIP_3 → Akt	Adenylyl cyclase → cAMP → PKA
Muscle and fat	GLUT4 to the surface	No receptor in human muscle; fat effect debated
Liver	Store glucose	Glycogen breakdown, gluconeogenesis

Insulin vs glucagon

Two hormones, two pathways

Insulin = tyrosine phosphorylation

Glucagon = cyclic AMP

Exam traps

- Glucagon has no direct action on human skeletal muscle: no receptor.
- GLUT4 insertion is the insulin pathway of muscle and fat, not glucagon.
- A glucagon injection works best if the liver still has glycogen.

Insulin vs glucagon signalling: receptors and effects

Video, written lesson, practice question and sources: medservatory.com/usmle-step-1/endocrinology/insulin-vs-glucagon-signalling

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