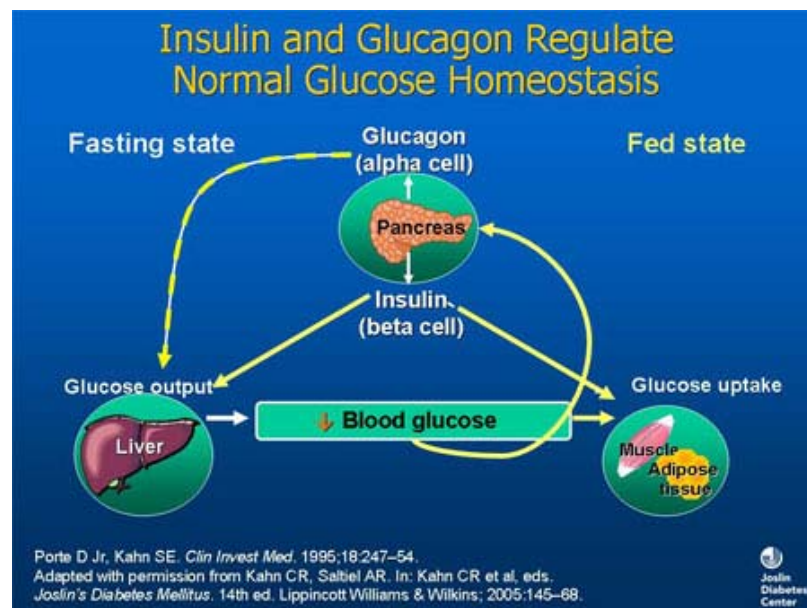


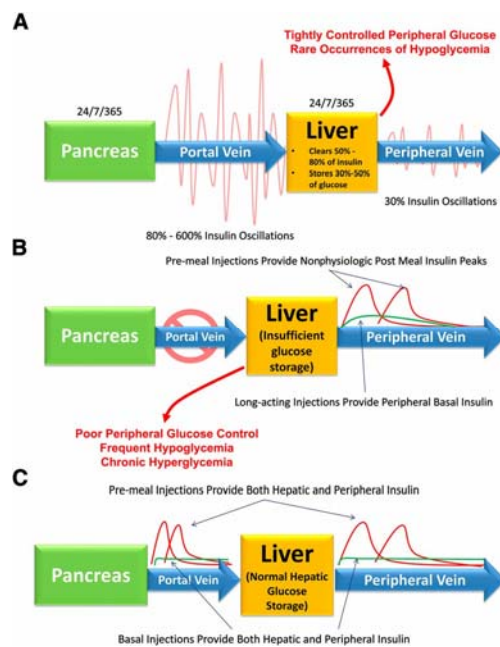
Control of blood glucose

Peter Thorn

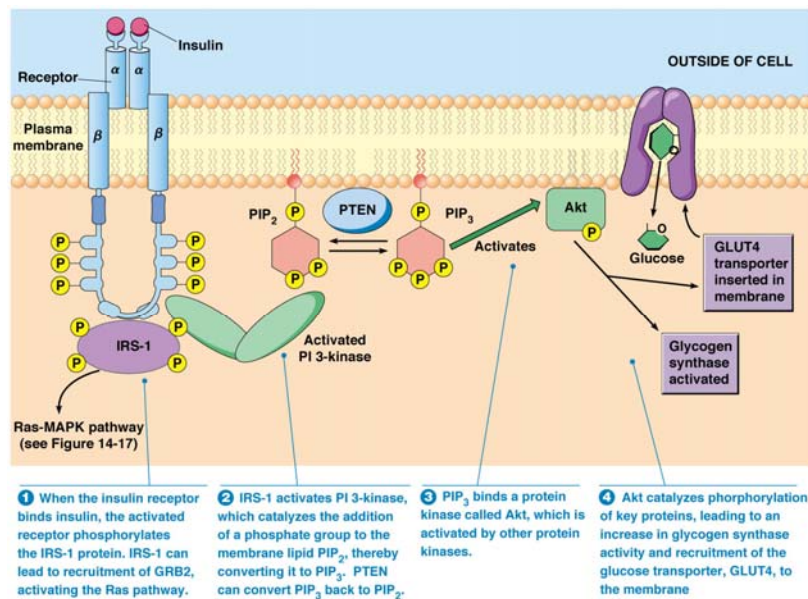
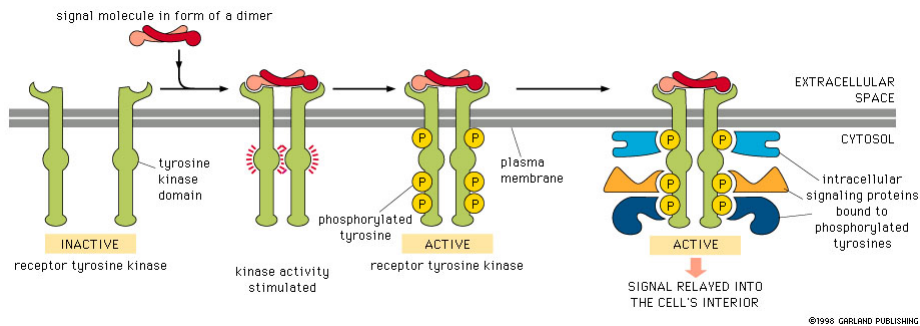


(1) Insulin-dependent reduction of blood glucose:

LIVER

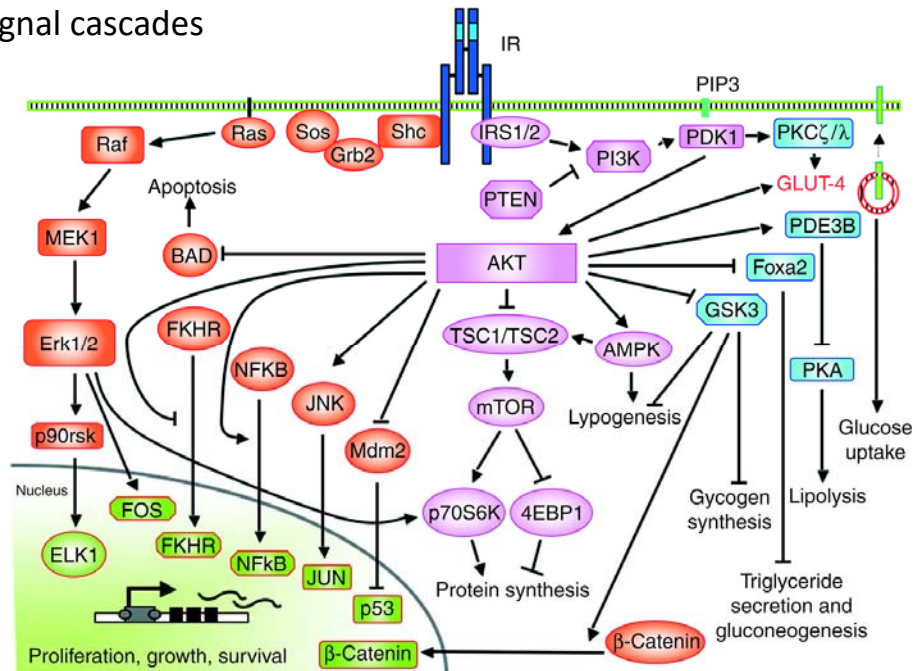


Tyrosine kinase receptor activation

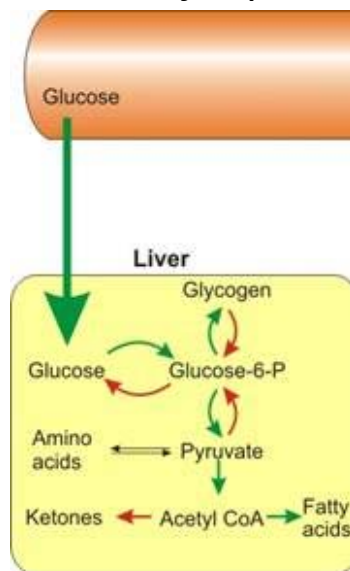


Insulin receptor signal cascades

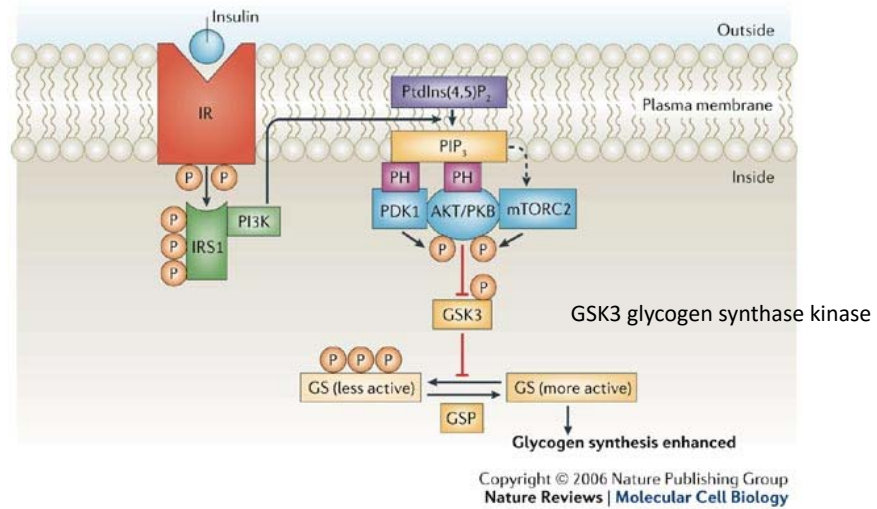
AKT=PKB



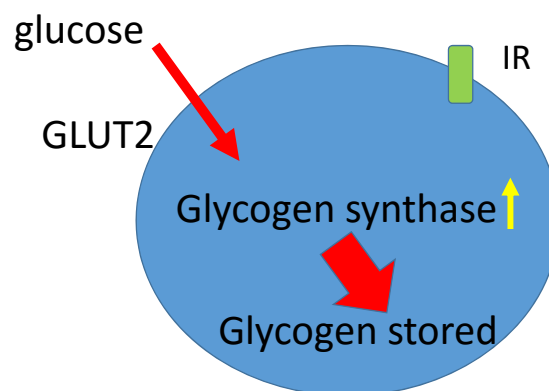
Hepatocyte: action on two major pathways



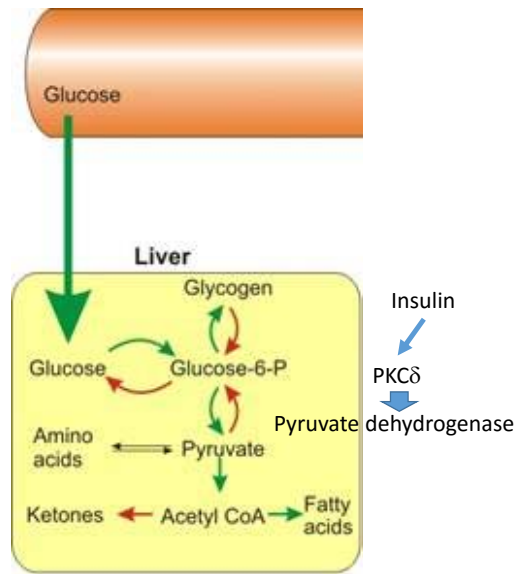
Insulin's major target in the liver is stimulation of glycogen production



Hepatocyte: storage of glycogen



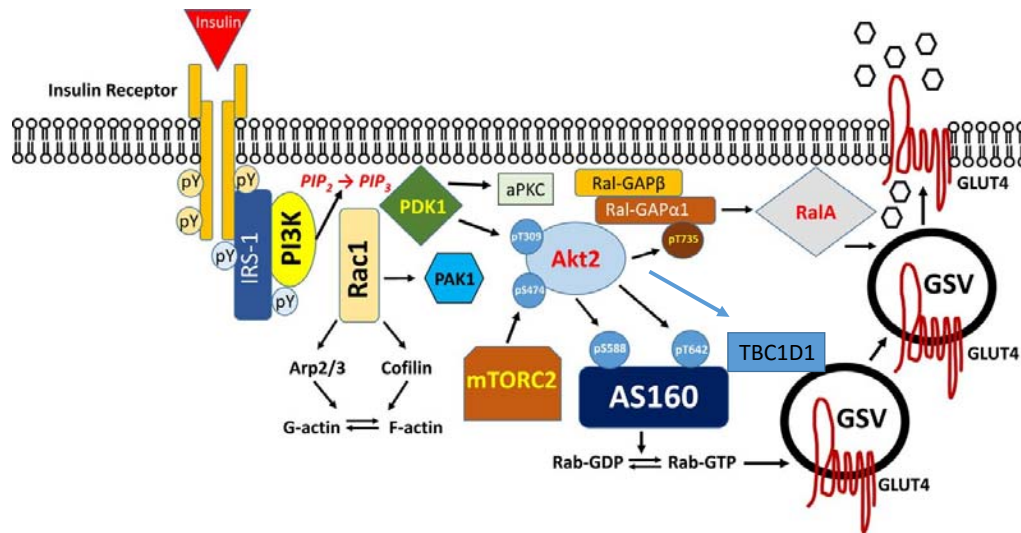
Hepatocyte: lipogenesis



(2) Insulin-dependent reduction of blood glucose

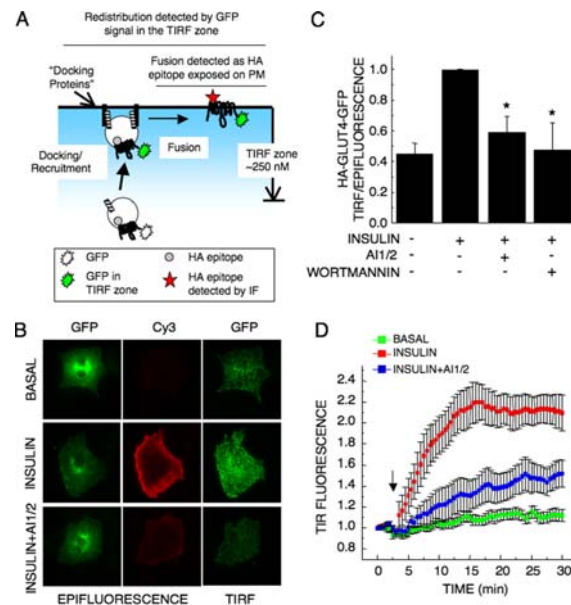
SKELETAL MUSCLE

Insulin's major action in skeletal muscle is to stimulate insertion of GLUT4 in the membrane

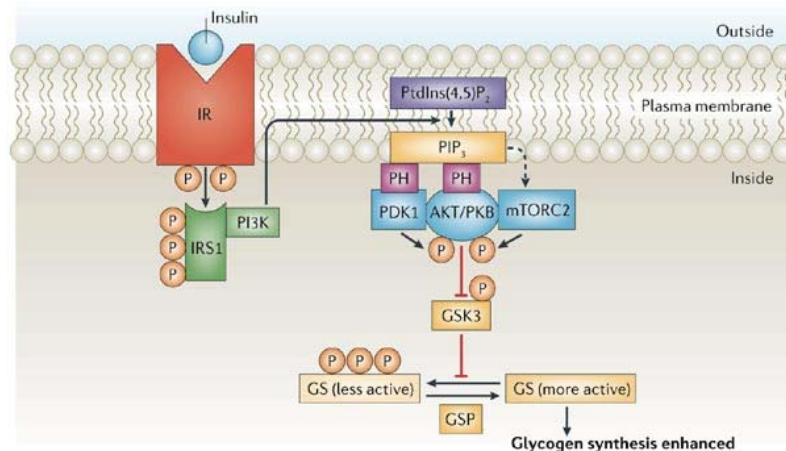


AKT dependent insertion of GLUT4 in skeletal muscle membrane

Inhibit AKT

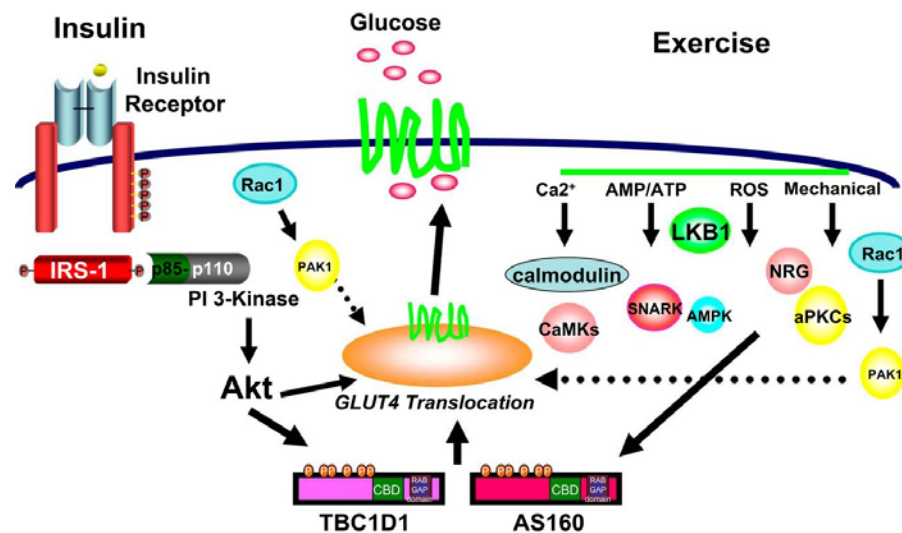


Insulin also stimulates glycogen production in skeletal muscle



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Insulin and exercise pathways intersect



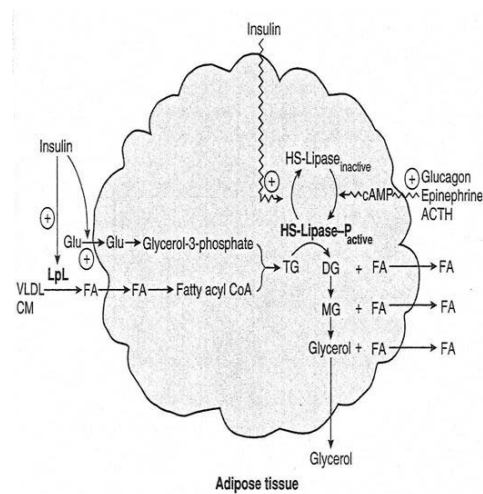
(3) Insulin-dependent reduction of blood glucose:

adipocytes

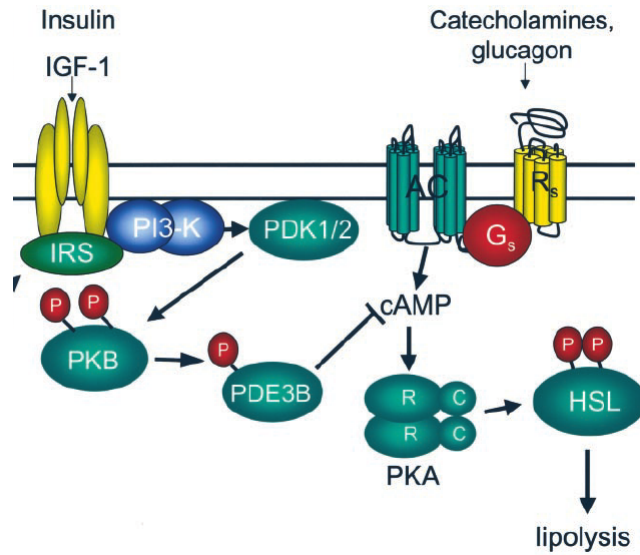
Insulin action to stimulate fat storage

Insulin action on adipocyte:

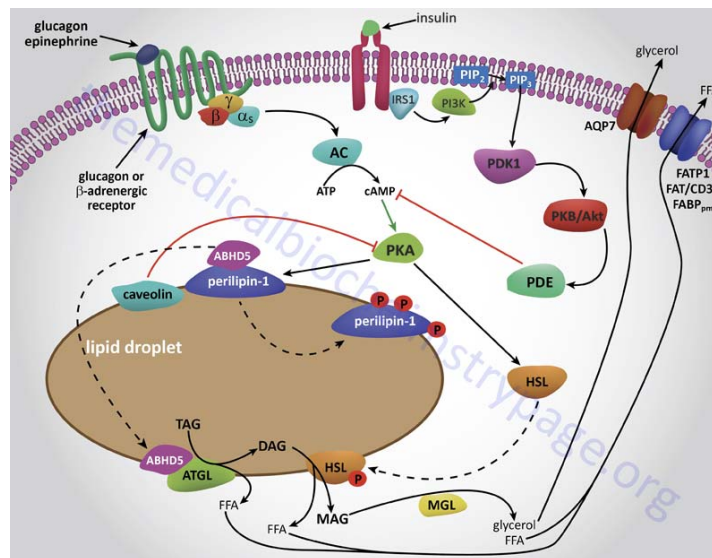
1. **Stimulates lipoprotein lipase, LPL**, to increase uptake of fatty acids from chylomicrons and very low-density lipoprotein, VLDL
2. **Stimulates glycogen production**
3. **Inactivates hormone-sensitive lipase**, to decrease lipolysis and increase triglyceride storage



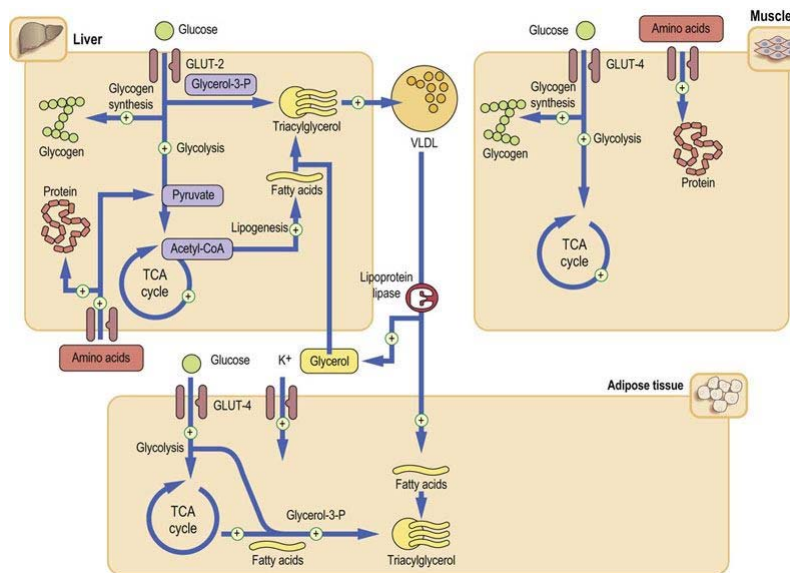
Molecular mechanism of insulin action to inhibit lipolysis (1) hormone-sensitive Lipase (HSL)



Molecular mechanism of insulin action to inhibit lipolysis (2) perilipin

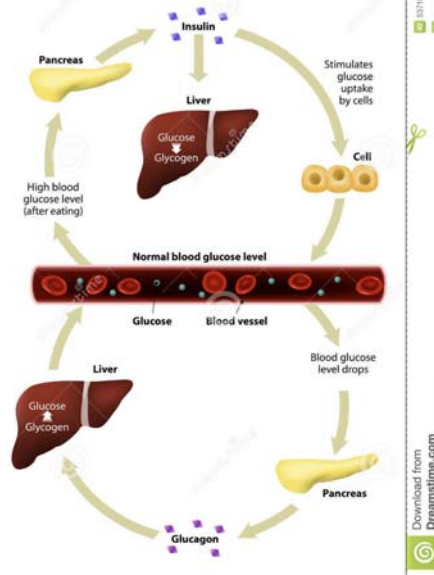


Summary

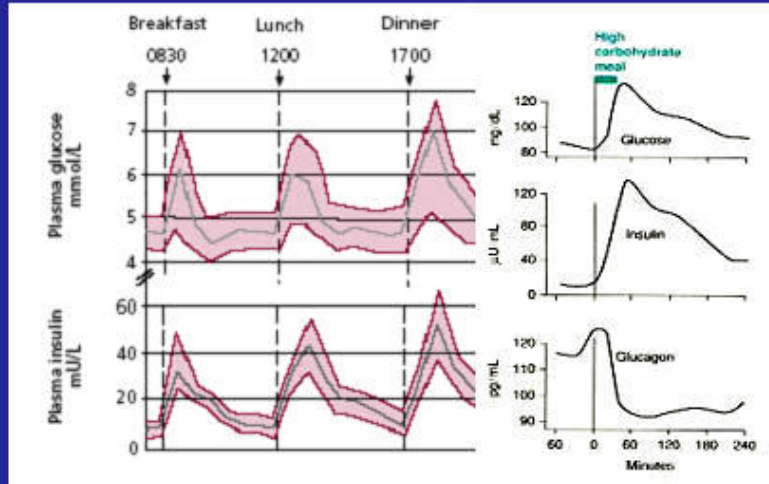


BUT... how do you raise
Glucose levels?

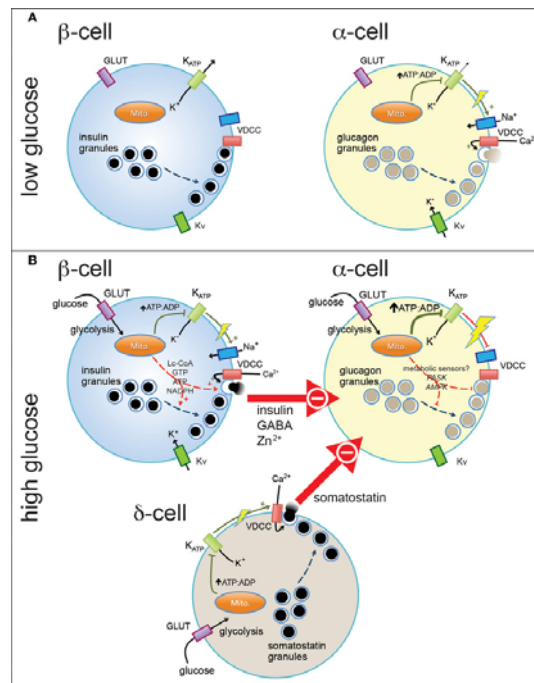
INSULIN AND GLUCAGON regulate blood glucose levels



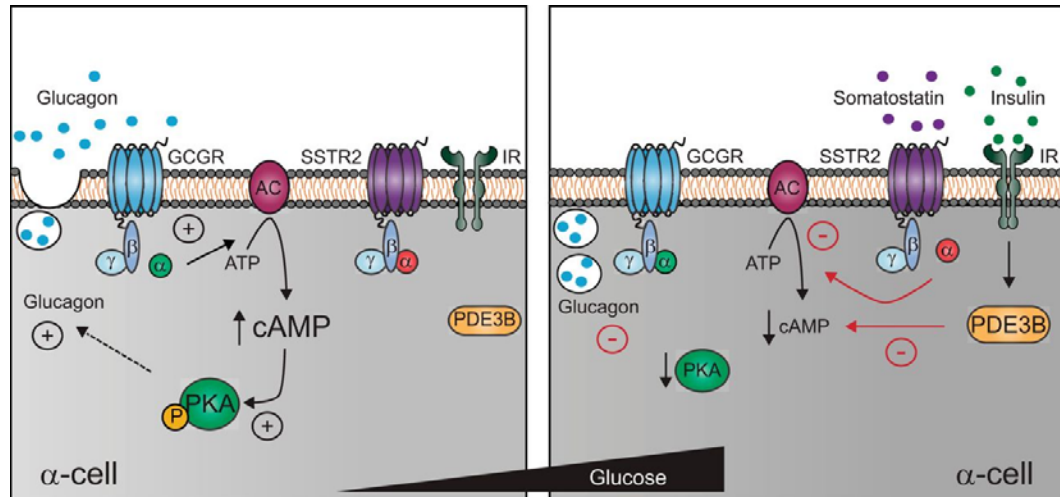
Insulin and Glucagon After Meals



Models for the control of glucagon secretion



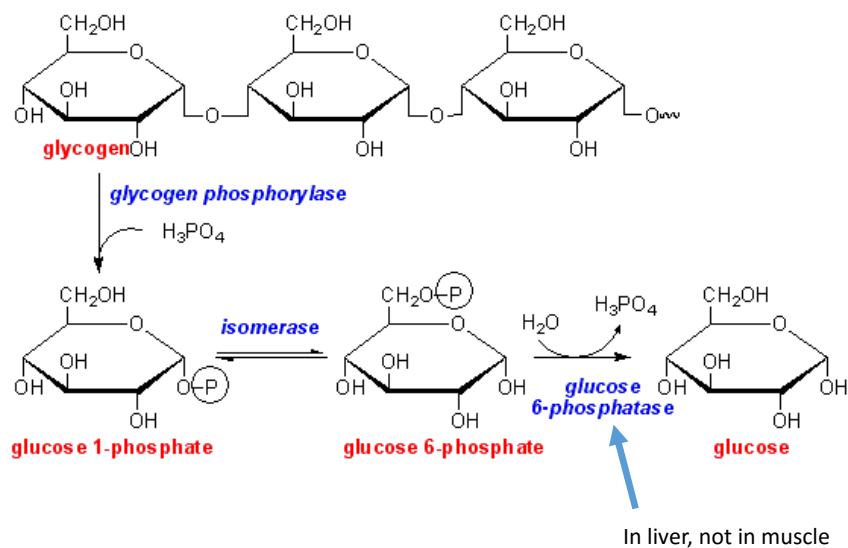
Model for the control of glucagon secretion: cAMP



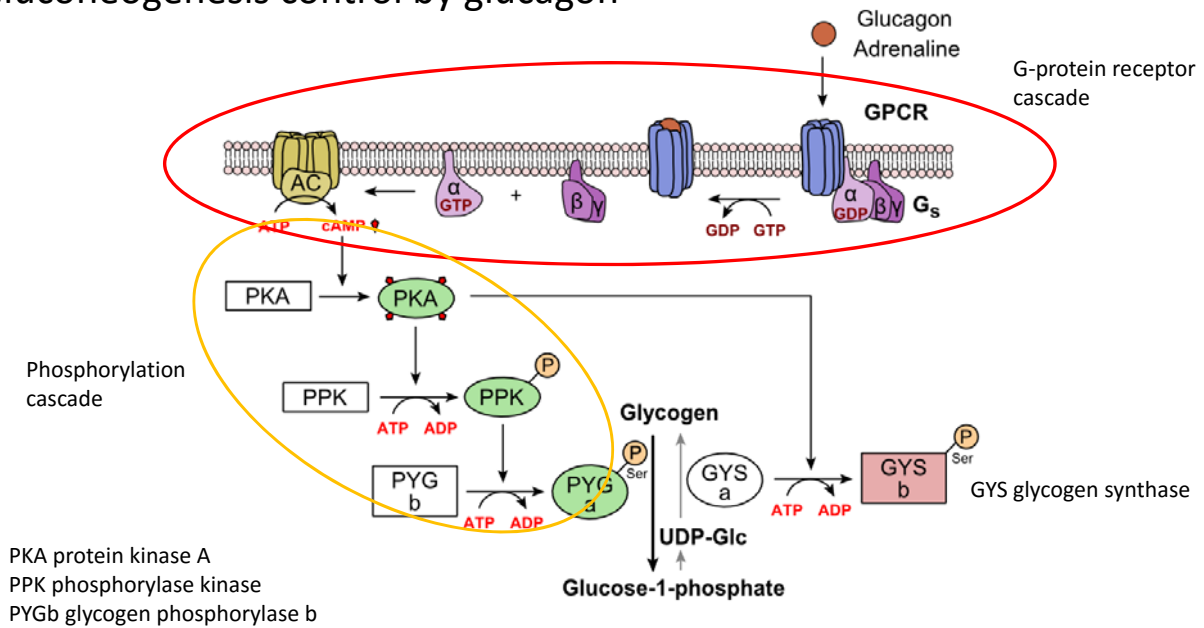
Somatostatin and insulin mediate glucose-inhibited glucagon secretion in the pancreatic α -cell by lowering cAMP
 Amicia D. Elliott, Alessandro Ustione, David W. Piston

What is the main target for glucagon?

Gluconeogenesis in the liver



Gluconeogenesis control by glucagon



Insulin and Glucagon Regulate Normal Glucose Homeostasis

