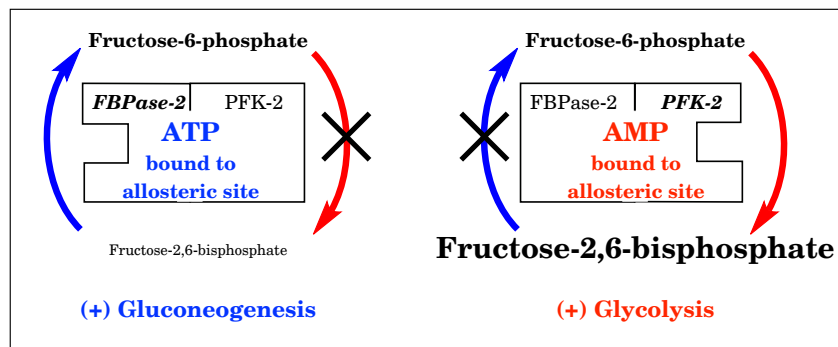
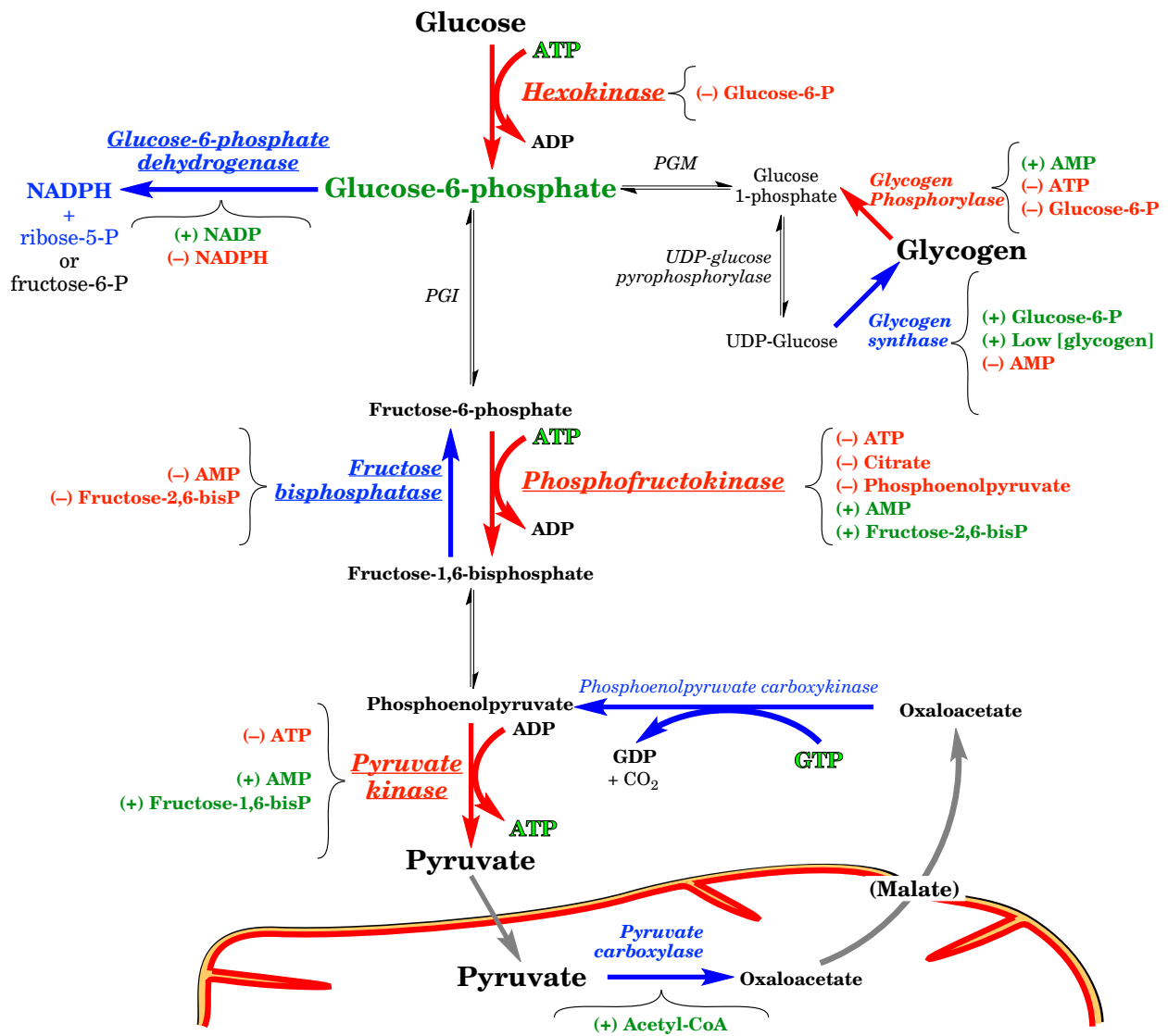
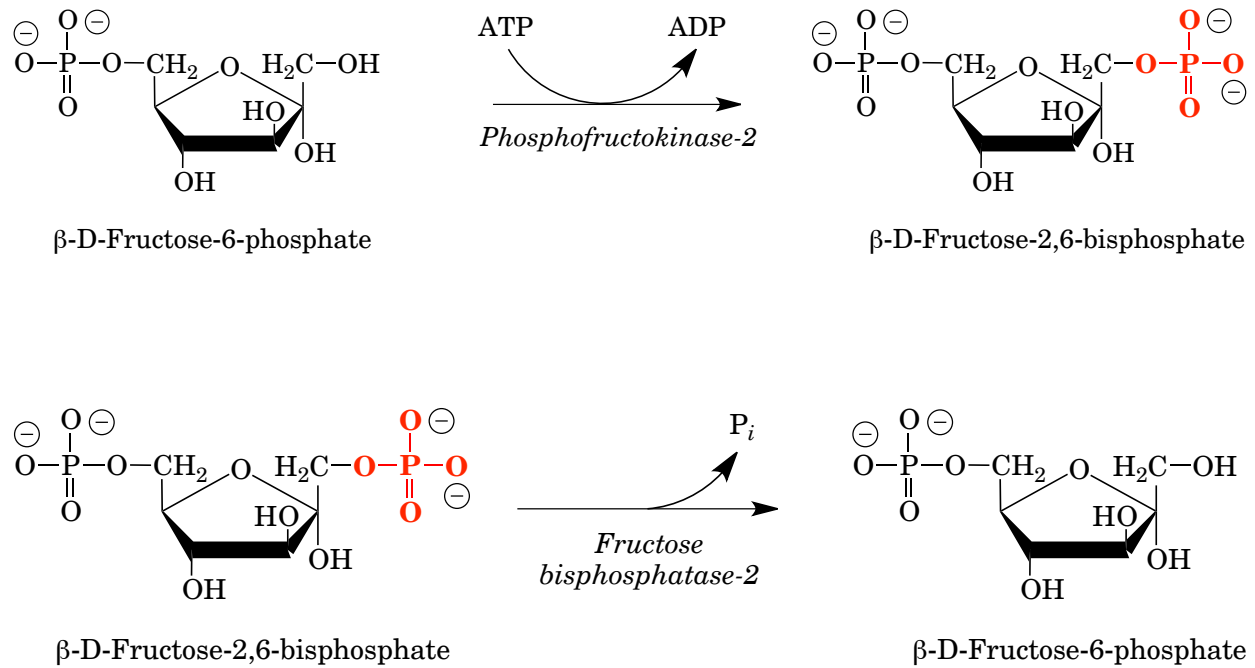


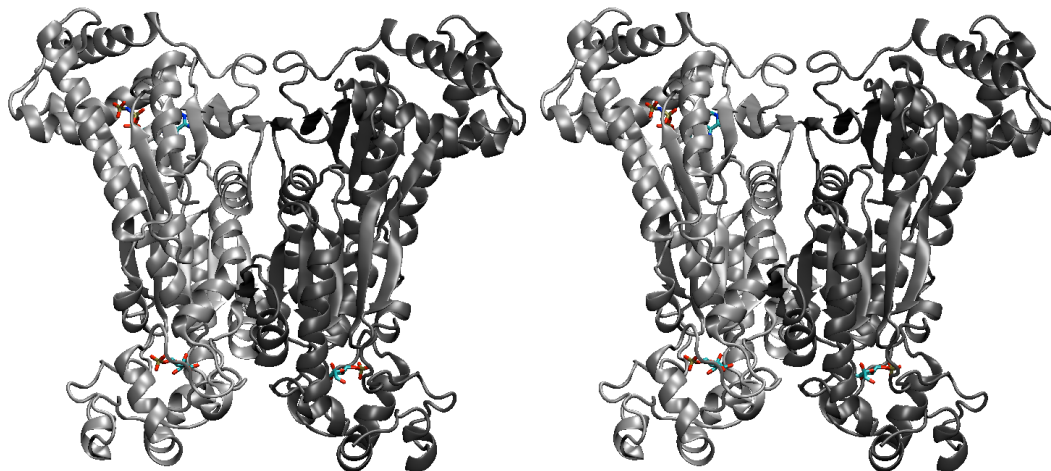
Regulation of Glucose Metabolism by Intracellular Compounds



Fructose-2,6-bisphosphate synthesis and breakdown



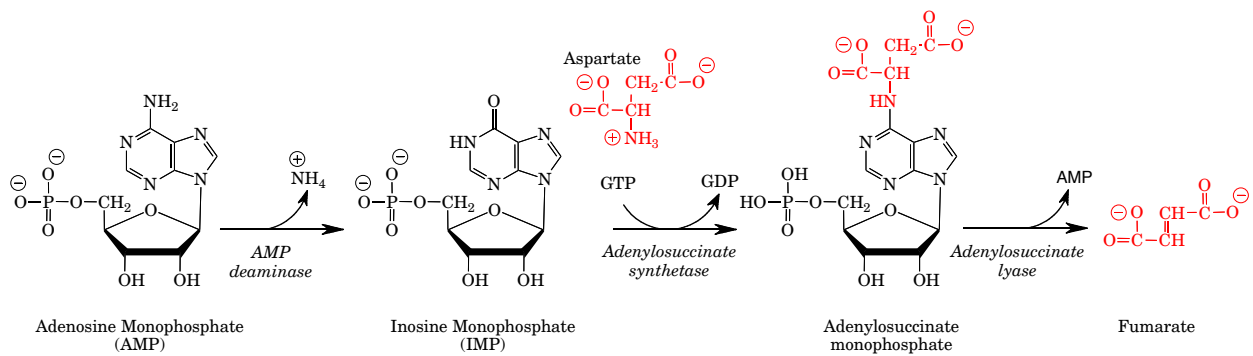
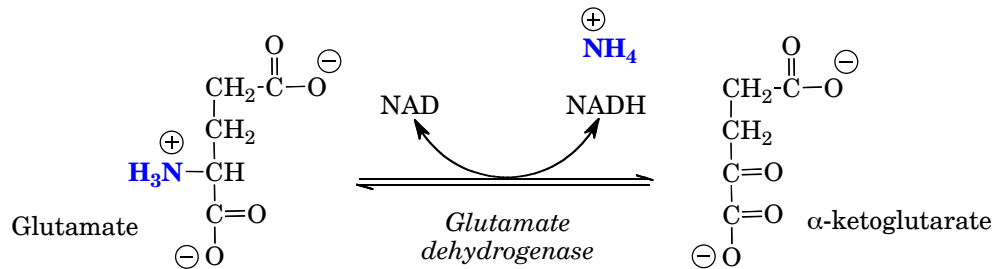
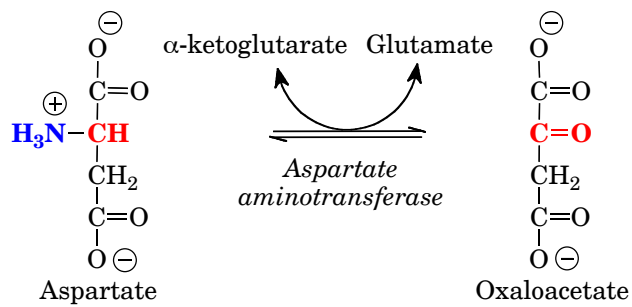
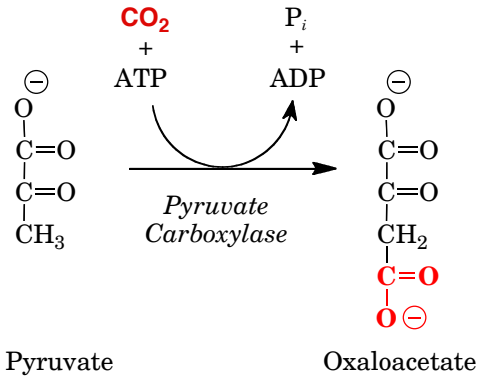
Stereoview of Phosphofructokinase-2/Fructose-bis-phosphatase-2
(*Rattus norvegicus*, PDB ID 1BIF)

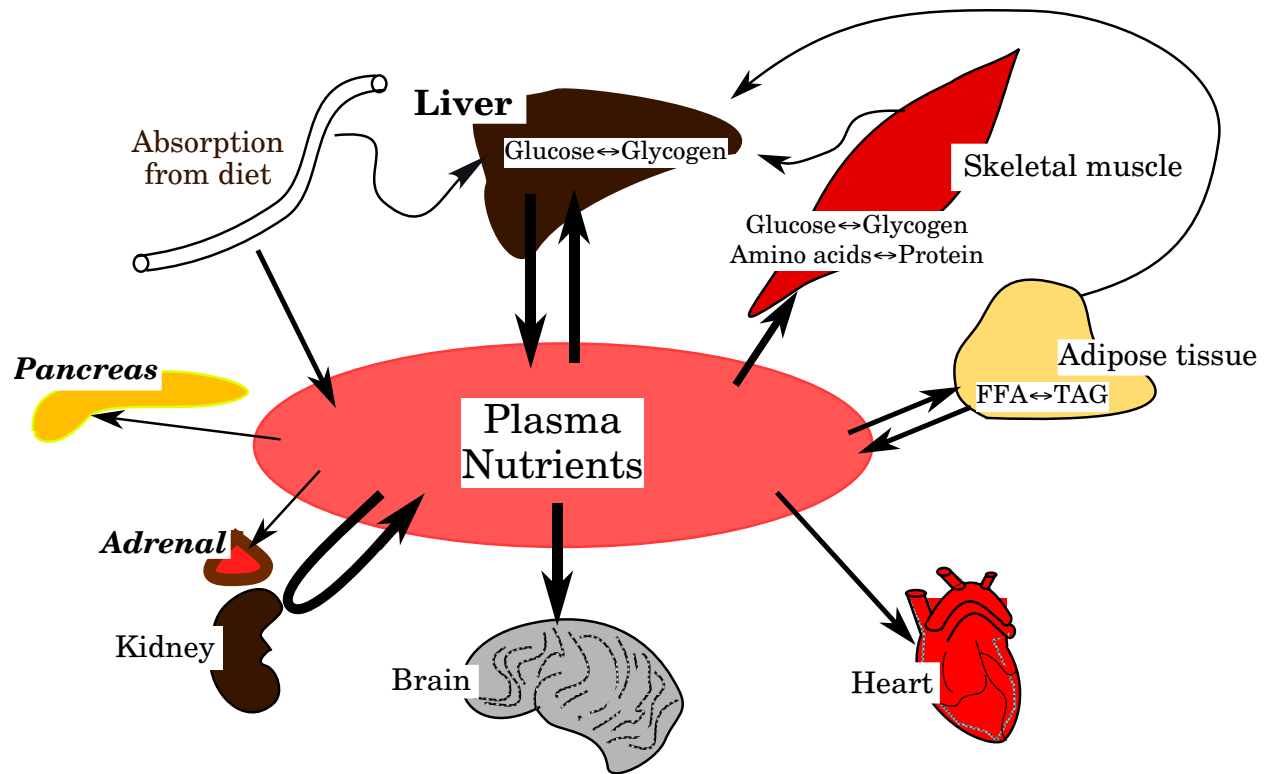


TCA Cycle Regulatory Enzymes

Enzyme	Stimulators	Inhibitors	Comments
<i>Pyruvate carboxylase</i>	Acetyl-CoA	ADP	Several hormones alter the amount of this enzyme: Insulin ↓ Cortisol ↑ Glucagon ↑
<i>Pyruvate dehydrogenase</i>	CoA-SH, NAD, Ca ²⁺ , Mg ²⁺ , pyruvate, insulin	Acetyl-CoA, NADH, phosphorylation, and ATP	Effect of Mg ²⁺ : ATP binds Mg ²⁺ with higher affinity than ADP; high free [Mg ²⁺] means low [ATP]. Mg ²⁺ and Ca ²⁺ activate the phosphatase
<i>Citrate synthase</i>	NAD, CoA-SH, ADP High [oxaloacetate] and [acetyl-CoA]	Citrate, Long chain acyl-CoA, ATP, NADH, succinyl-CoA	
<i>Isocitrate dehydrogenase</i>	Ca ²⁺ , ADP	ATP, NADH	Isocitrate dehydrogenase is the most important regulatory enzyme in the TCA cycle
<i>α-Ketoglutarate dehydrogenase</i>	Ca ²⁺	NADH, succinyl-CoA	

TCA Substrates

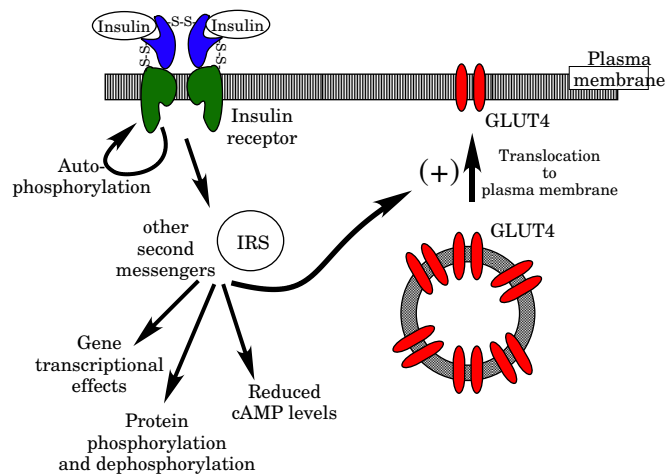
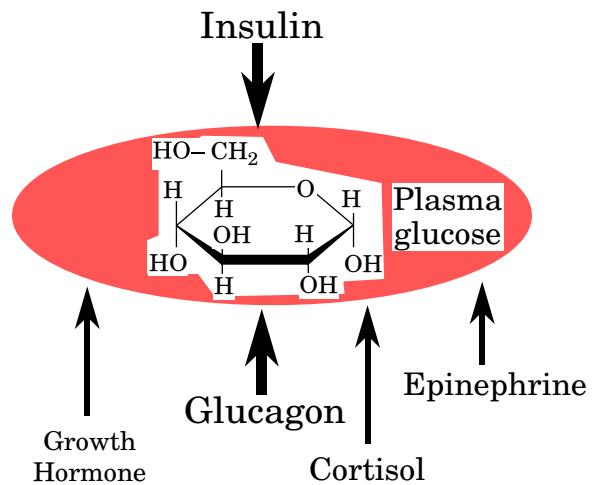
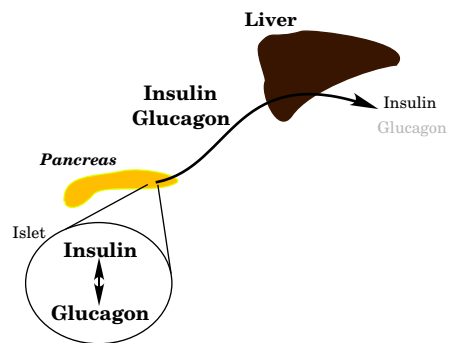
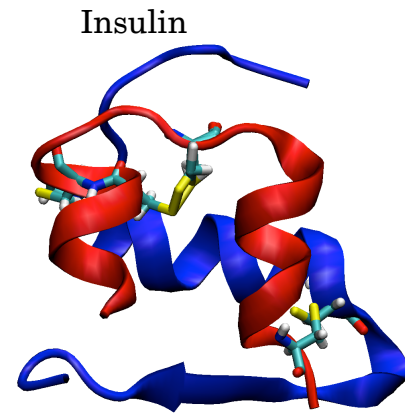
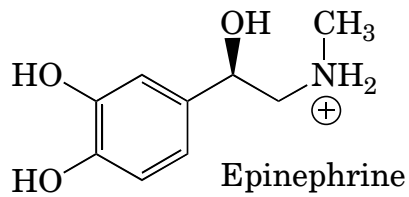
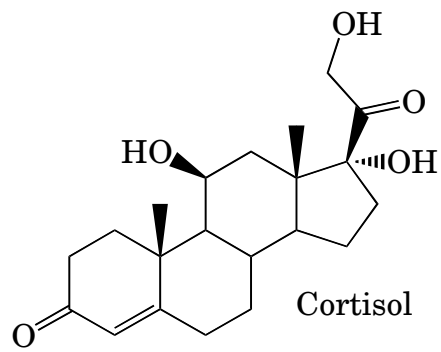




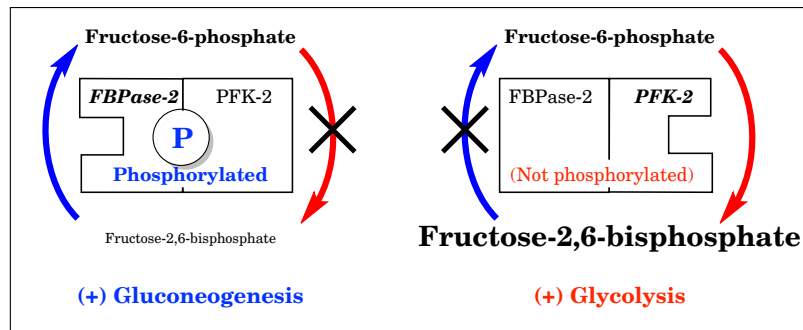
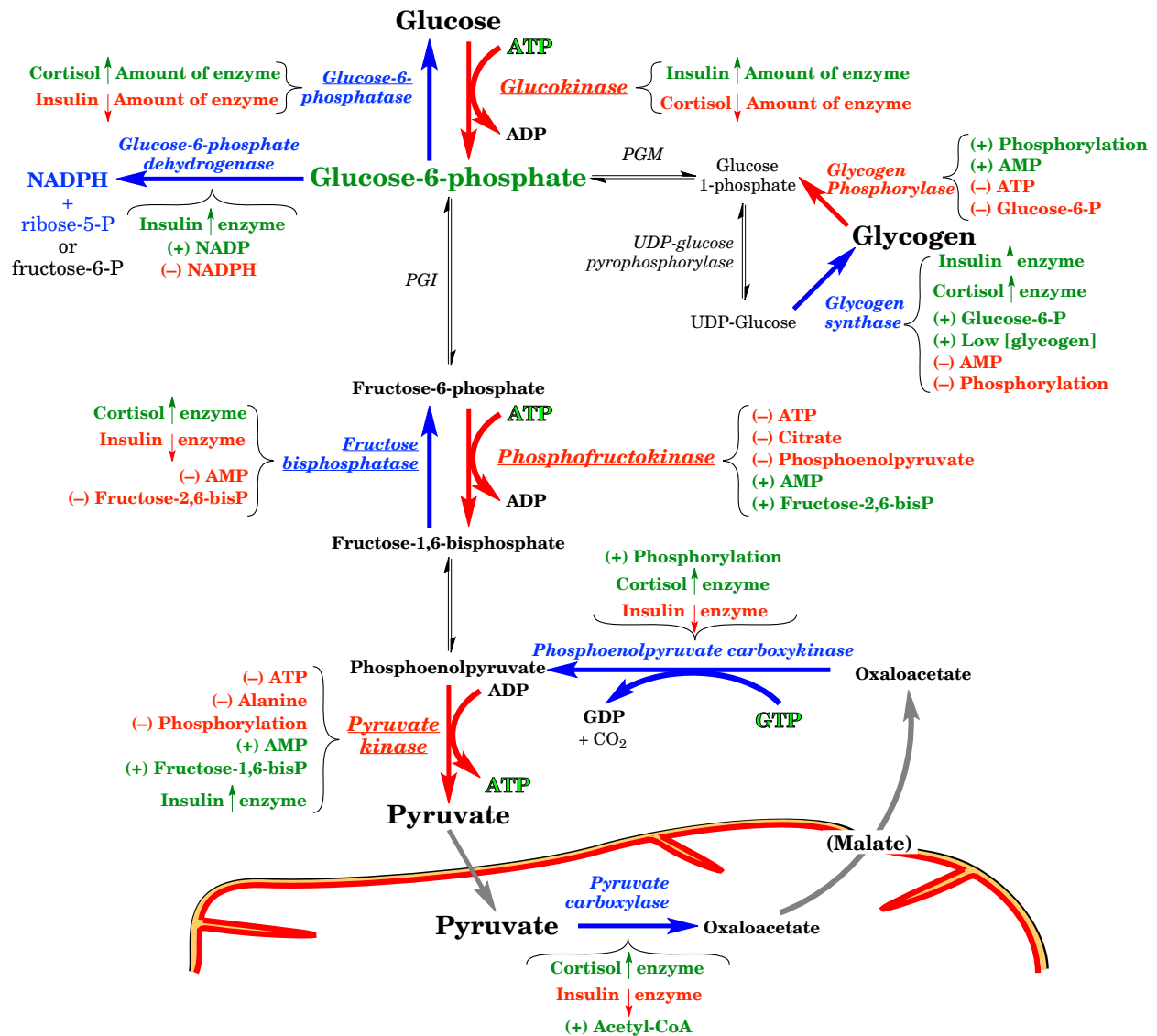
Glucose Homeostasis Control Hormones

Hormone	Receptor	Second messenger	Mechanism	Target tissues
Insulin (51 amino acid heterodimeric peptide)	Tyrosine kinase	Phosphorylated proteins decreased cAMP	Δ Enzyme activity Gene transcription	Liver, muscle, adipose, pancreas, many others
Glucagon (29 amino acid peptide)	G-protein coupled	cAMP	Δ Enzyme activity Sometimes gene transcription	Liver, pancreas
Cortisol (steroid)	Transcription factor	Altered level of specific mRNA	Gene transcription	Nearly all
Epinephrine (tyrosine derivative)	G-protein coupled (at least four types)	cAMP decreased cAMP PI hydrolysis	Δ Enzyme activity	Liver, muscle, adipose, brain, pancreas, cardiovascular
Growth hormone (191 amino acid protein)	Cytokine family cell surface	Tyrosine kinase PI hydrolysis	Δ Enzyme activity Sometimes gene transcription	Liver, muscle, adipose; others mediated by IGF-I

Glucose Homeostasis



Regulation of Glucose Metabolism (Liver)



Regulation of Glucose Metabolism (Skeletal Muscle)

