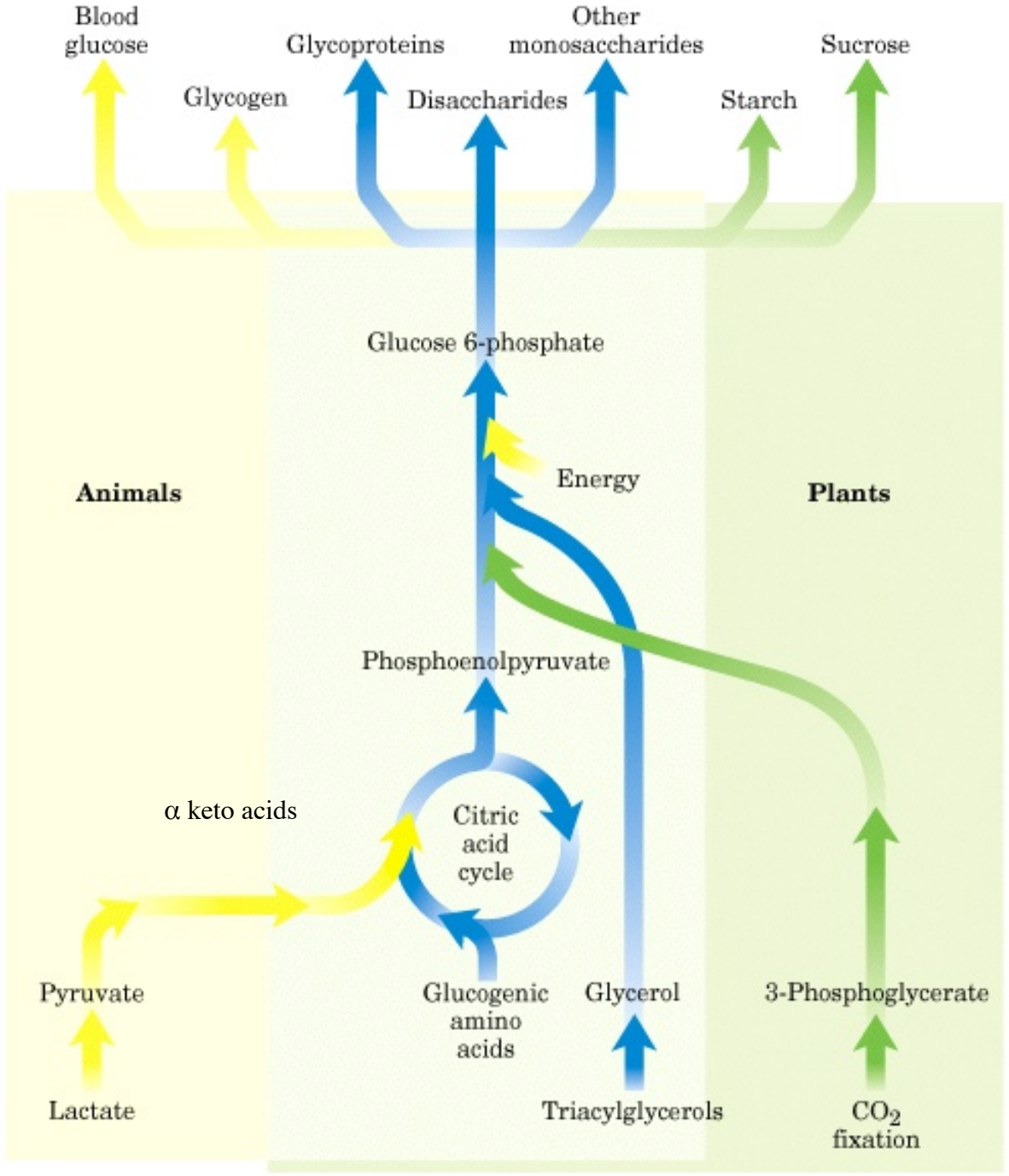

Comencemos con Gluconeogenesis



Glycerol= Adipose tissue, Phosphorylated by glycerol kinase to glycerol phosphate then is oxidized to DHA by glycerol phosphate dehydrogenase

Adipocytes do not have glycerol kinase so they cant phosphorylate Glycerol

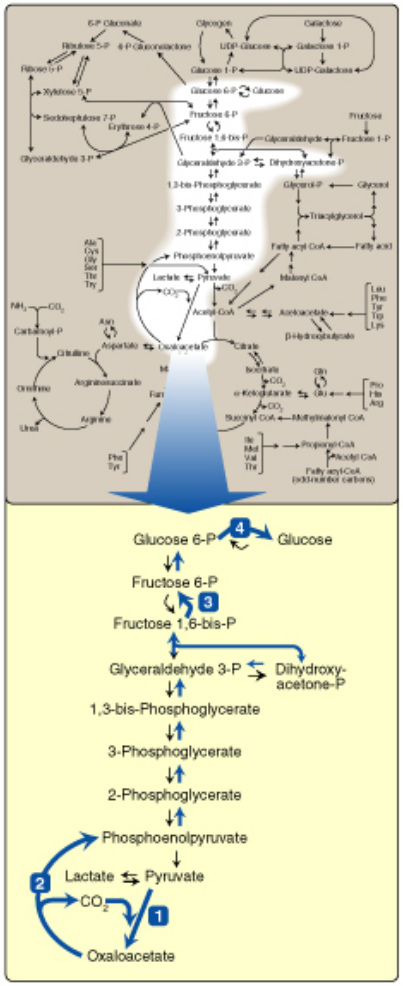


Figure 10.1

The gluconeogenesis pathway shown as part of the essential pathways of energy metabolism. The numbered reactions are unique to gluconeogenesis. (See Figure 8.2, p. 90 for a more detailed view of the metabolic map.)

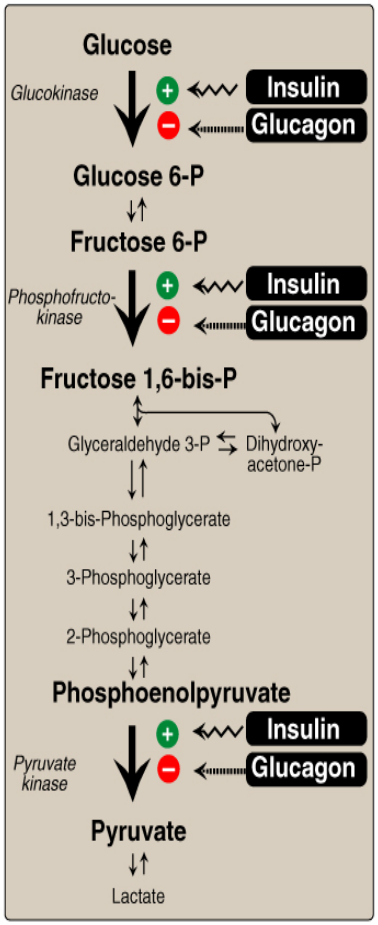
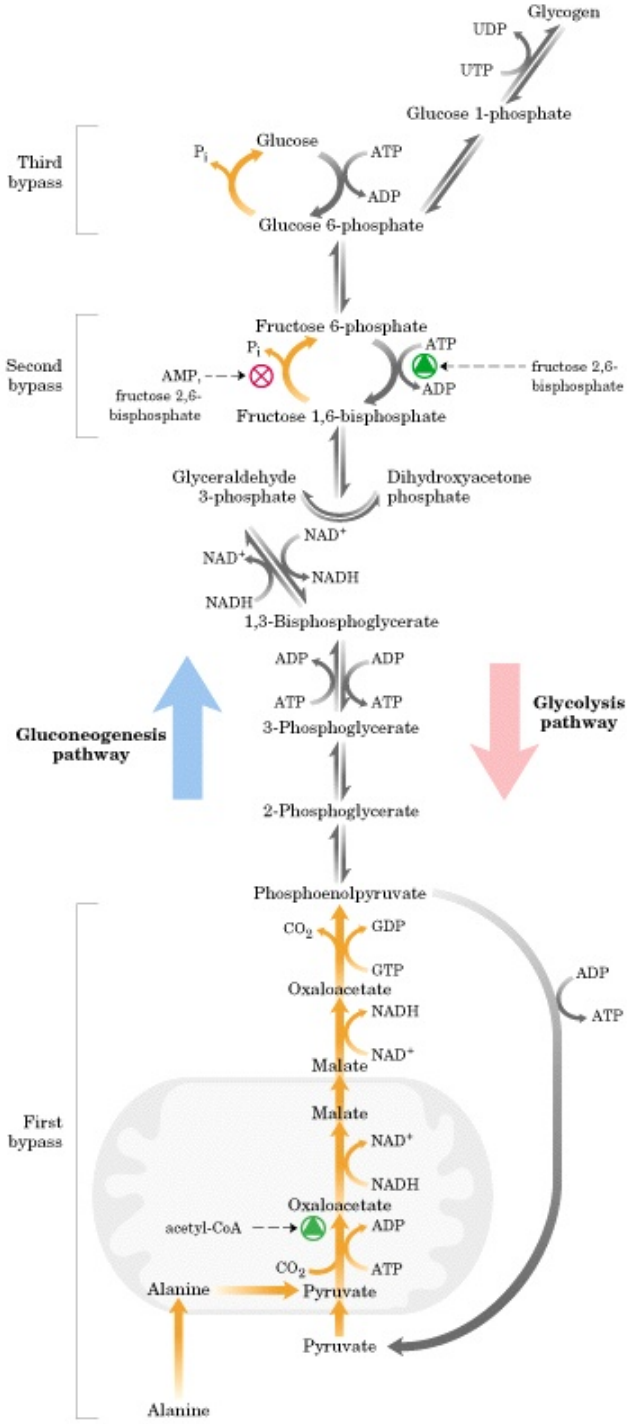
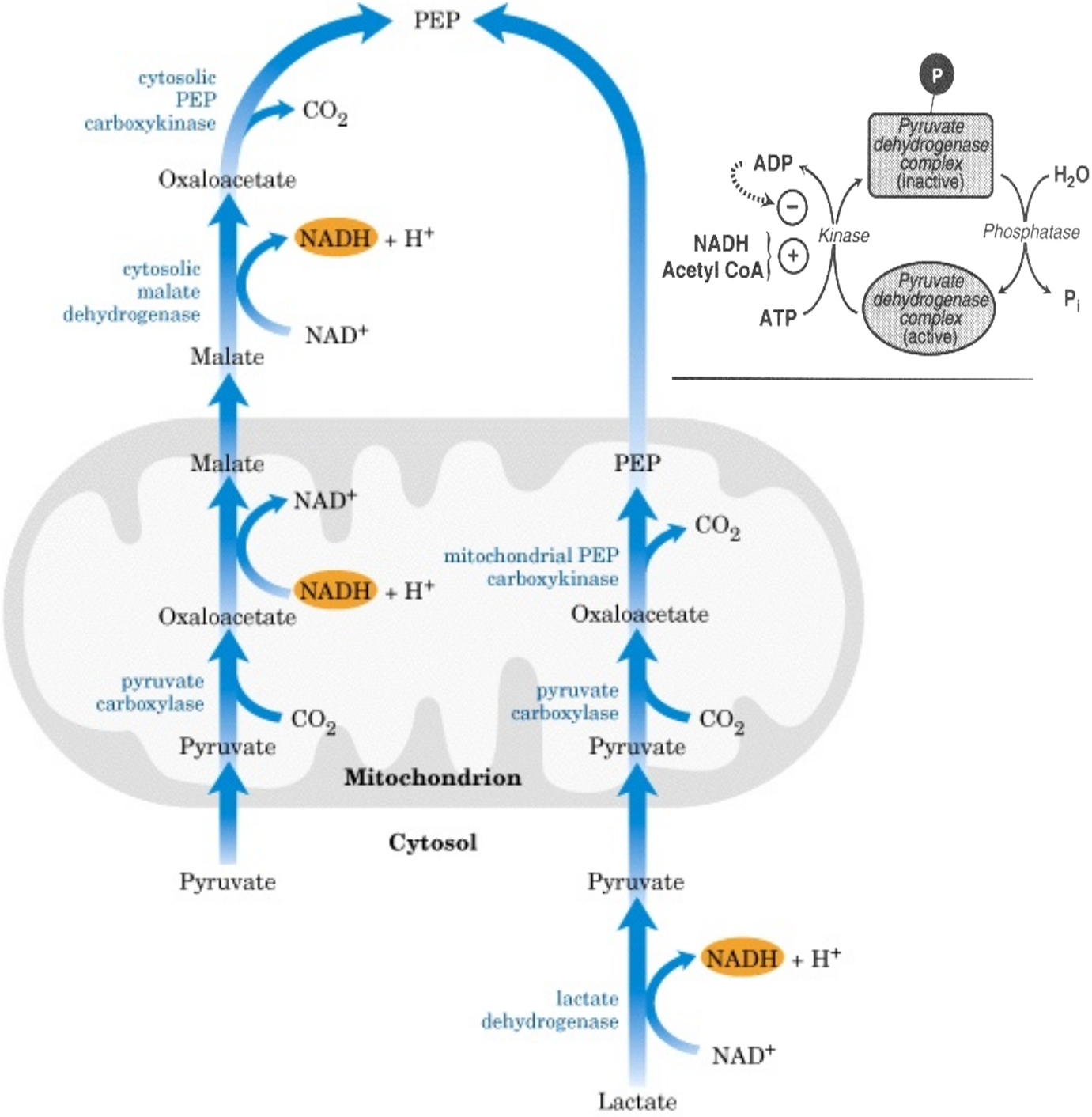


Figure 8.23

Effect of insulin and glucagon on the synthesis of key enzymes of glycolysis in liver.




PEP
cytosolic PEP carboxykinase
CO_2
Oxaloacetate
NADH + H^+
cytosolic malate dehydrogenase
NAD^+
Malate
Malate
NAD^+
NADH + H^+
Oxaloacetate
pyruvate carboxylase
CO_2
Pyruvate
Mitochondrion
Cytosol
Pyruvate
PEP
CO_2
mitochondrial PEP carboxykinase
Oxaloacetate
pyruvate carboxylase
CO_2
Pyruvate
Pyruvate
NADH + H^+
lactate dehydrogenase
NAD^+
Lactate
P
Pyruvate dehydrogenase complex (inactive)
ADP
H_2O
NADH
Acetyl CoA
Kinase
Phosphatase
ATP
Pyruvate dehydrogenase complex (active)
P_i

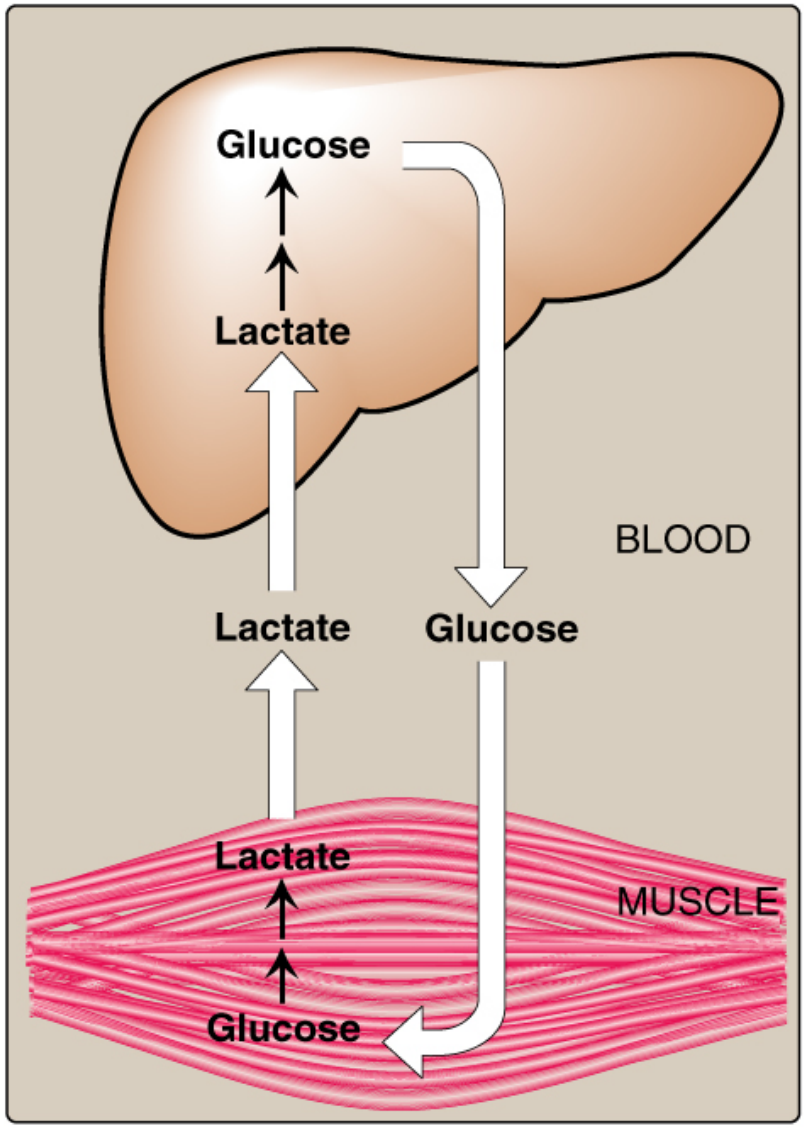


Figure 10.2
The Cori cycle.

Lactate is released by cells lacking mitochondria and by exercising skeletal muscle. Cori cycle lactate to glucose in the liver.

Amino acids: main source during a fast. α-ketoacids they can enter the TCA cycle and converted to OAA and then to PEP

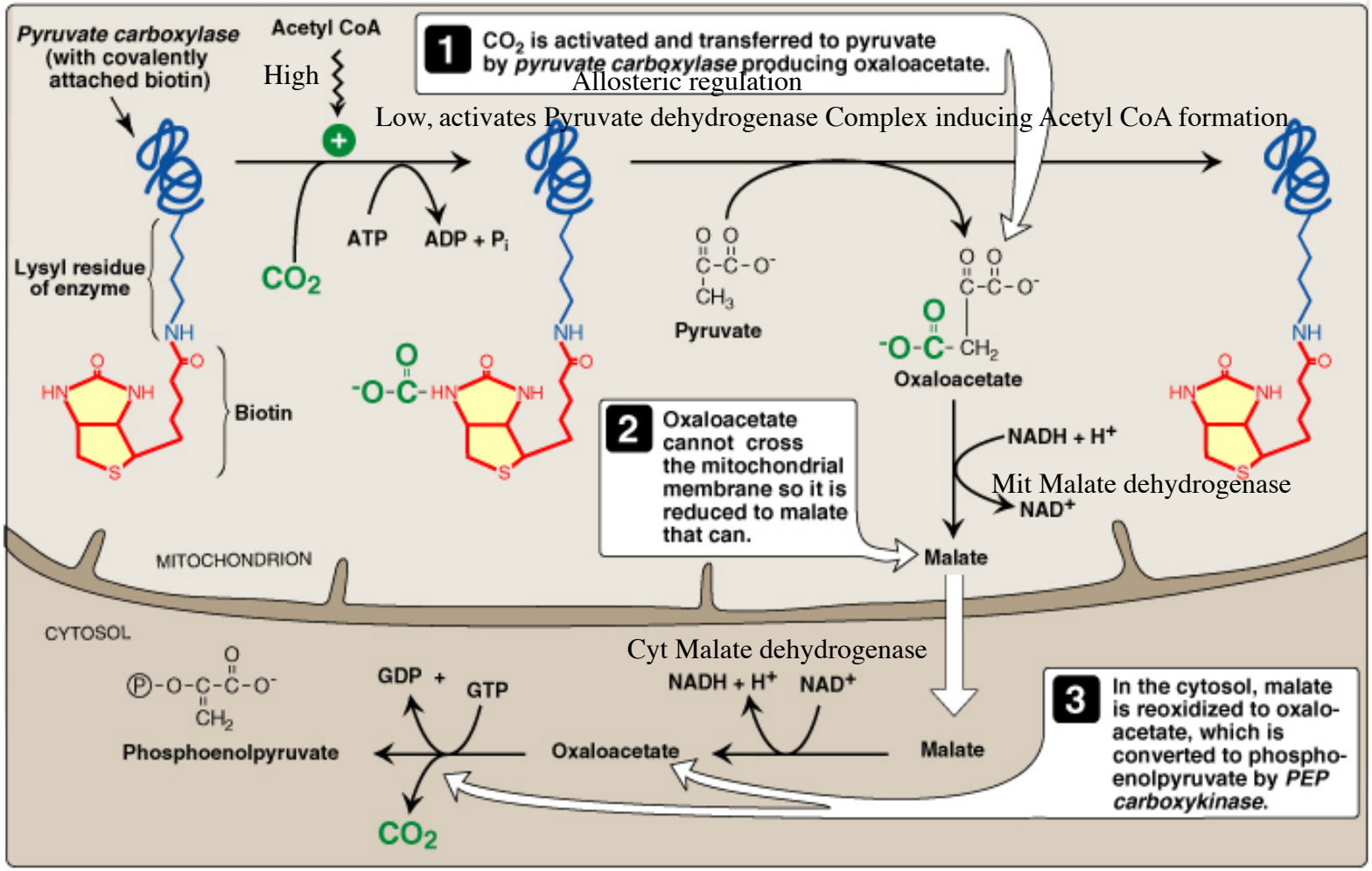
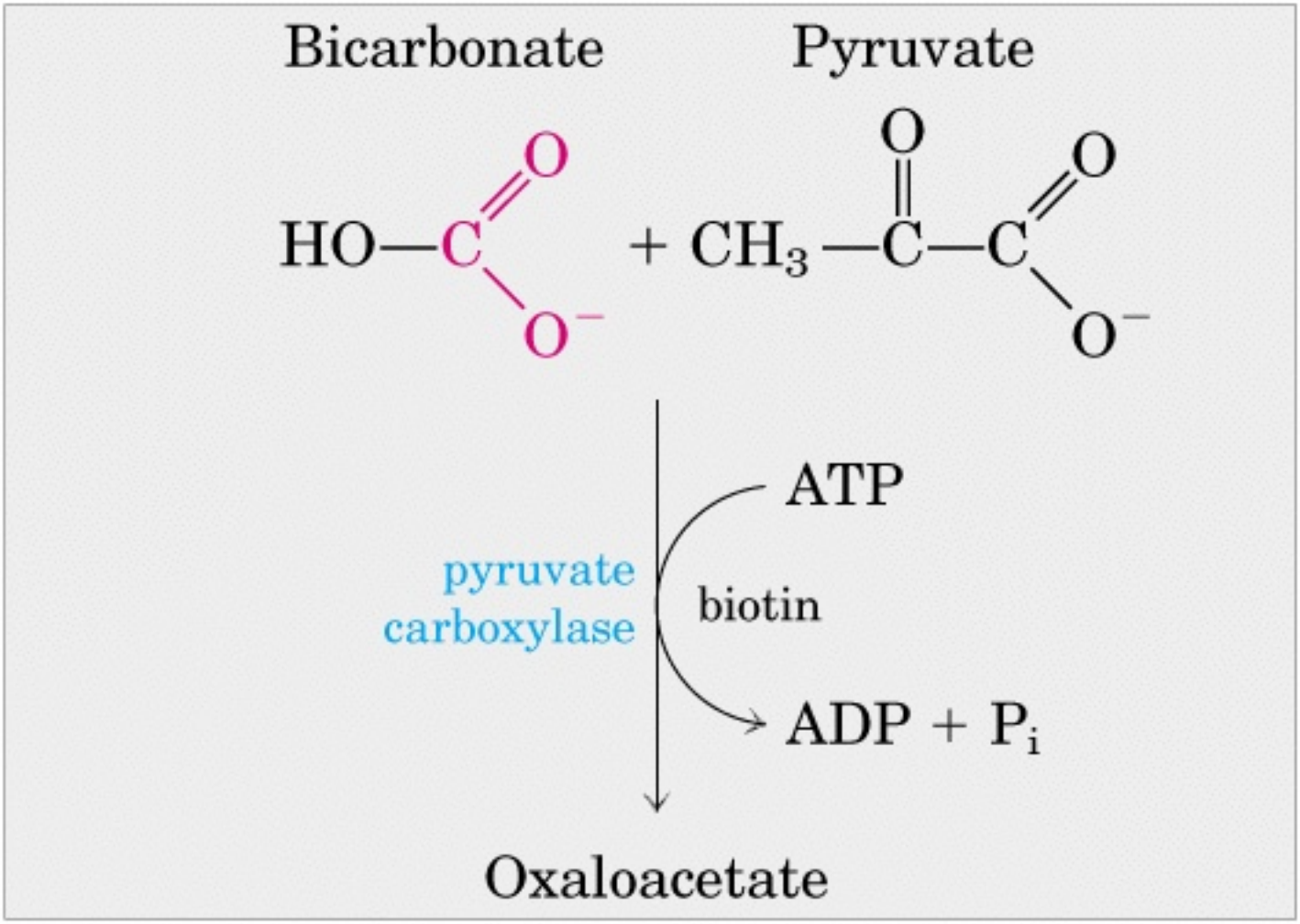


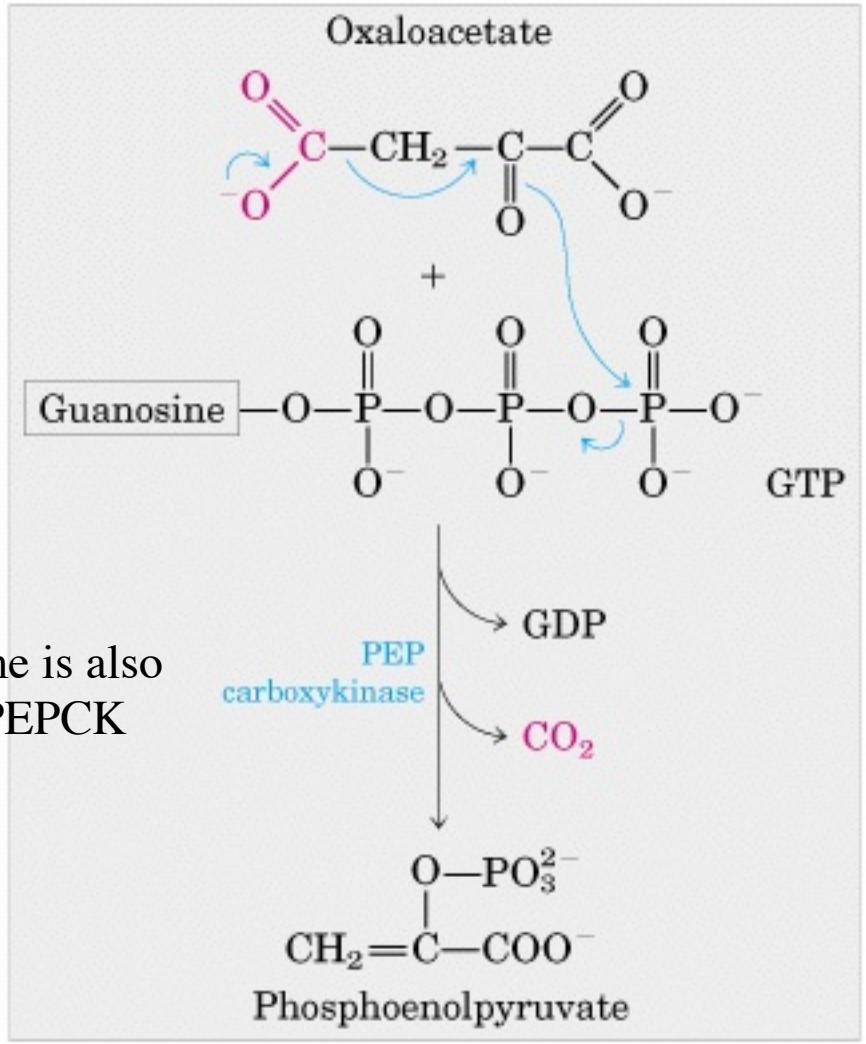
Figure 10.3

Activation and transfer of CO_2 to pyruvate, followed by transport of oxaloacetate to the cytosol and subsequent decarboxylation.

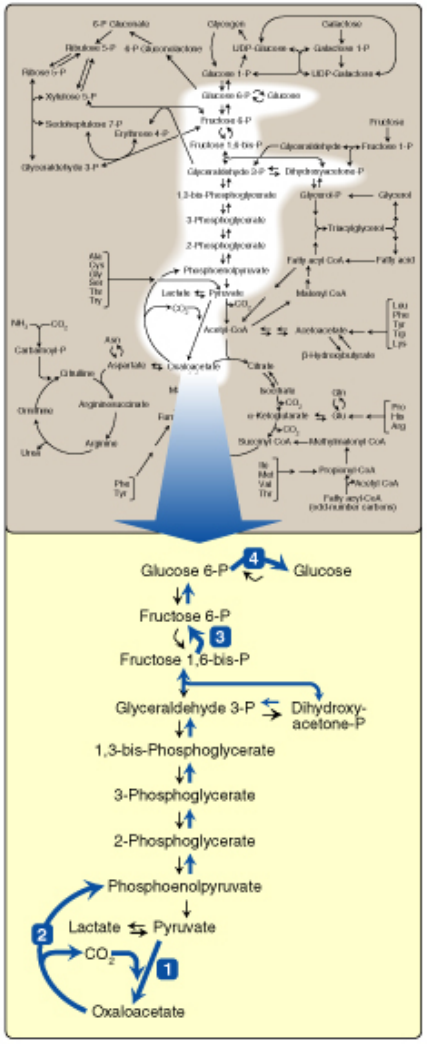

Bicarbonate
Pyruvate
HO—C(=O)—O⁻
+ CH3—C(=O)—C(=O)—O⁻
ATP
pyruvate carboxylase
biotin
ADP + Pi
Oxaloacetate

(a)

This enzyme is also known as PEPCK



(b)



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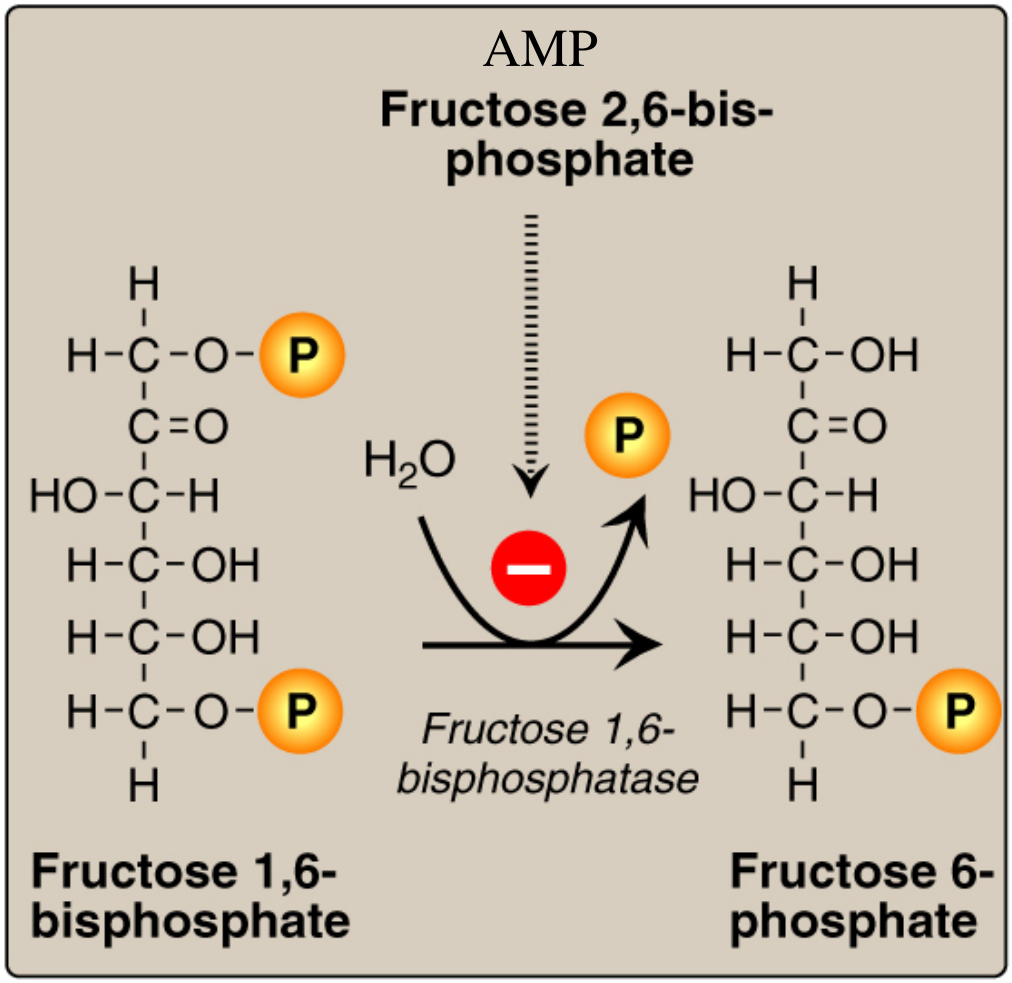


Figure 10.4

Dephosphorylation of fructose 1,6-bisphosphate.

Adenosine Monophosphate (-)
found in Liver and Kidney FBP1

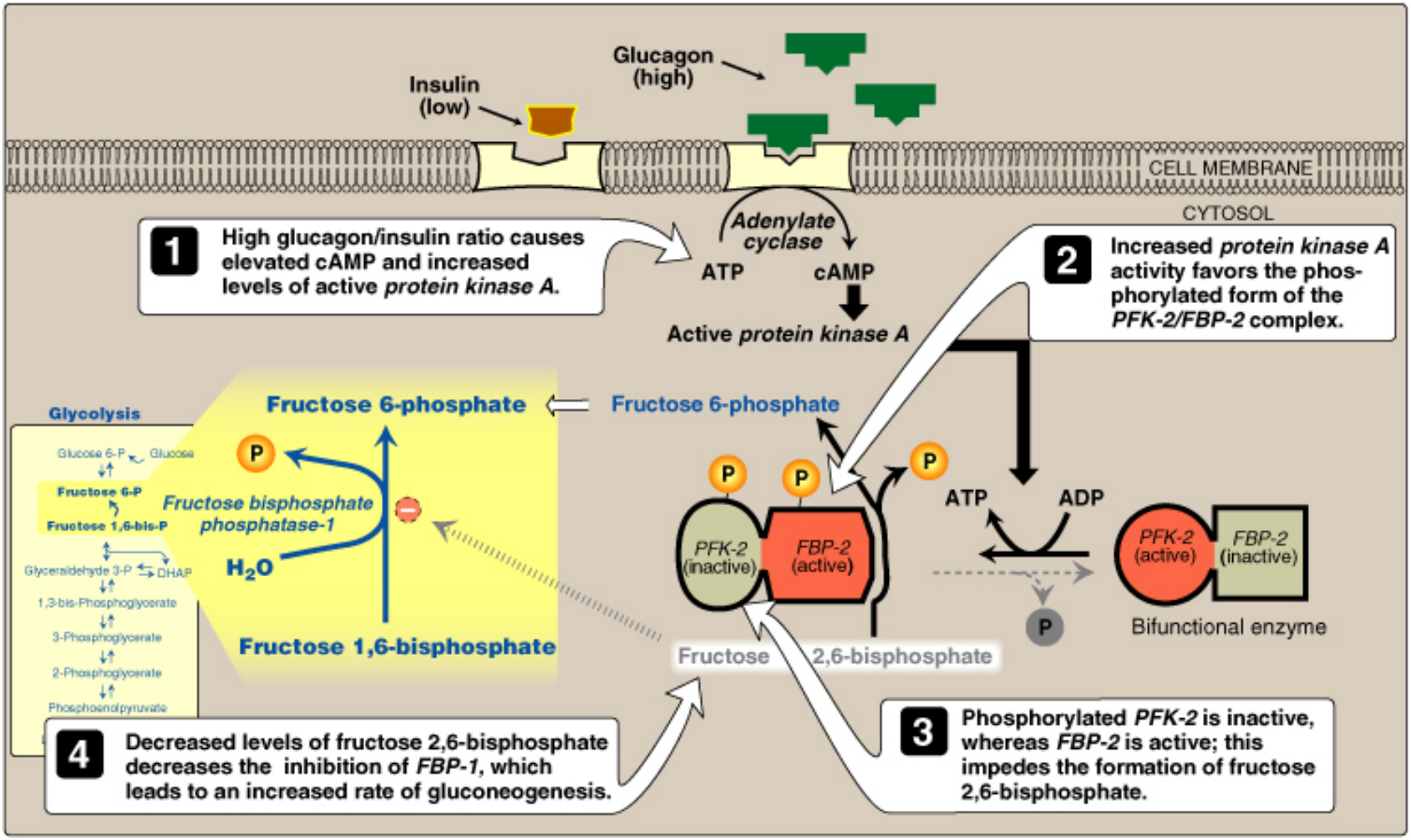
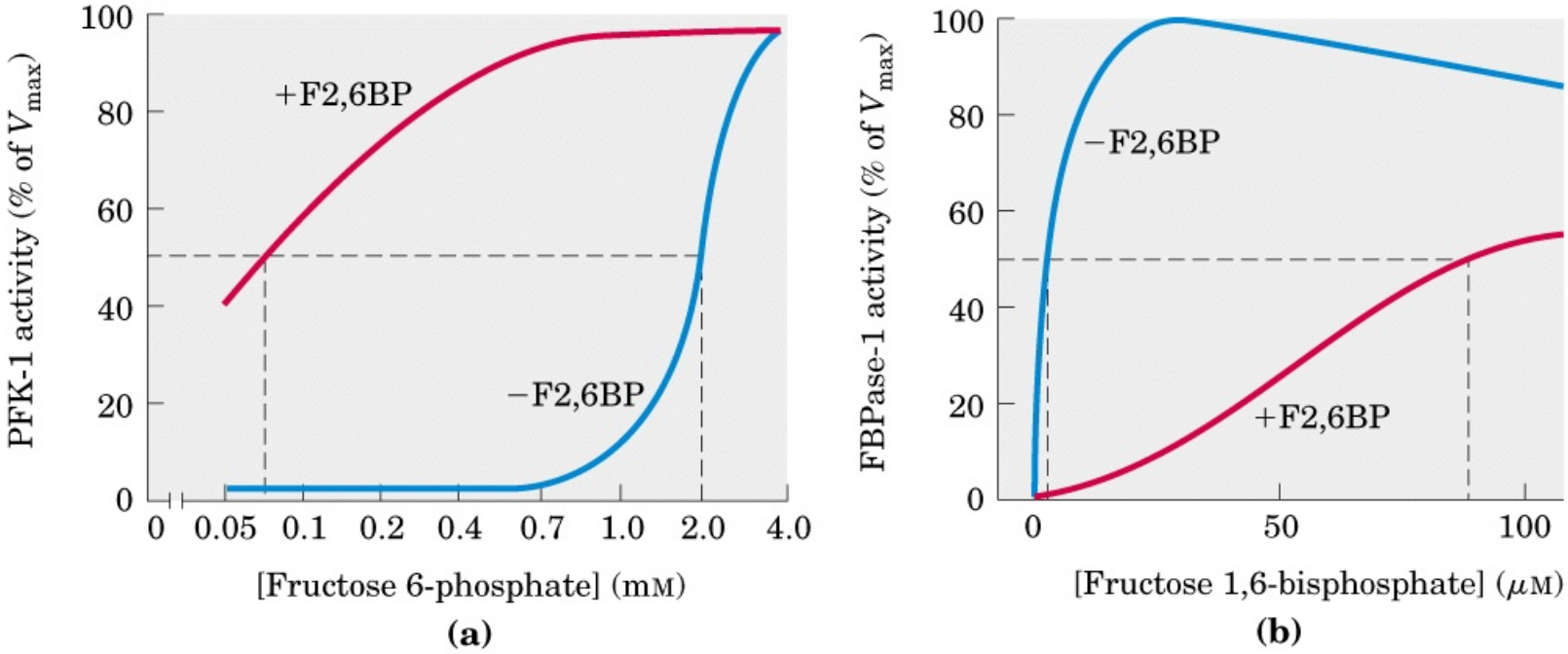
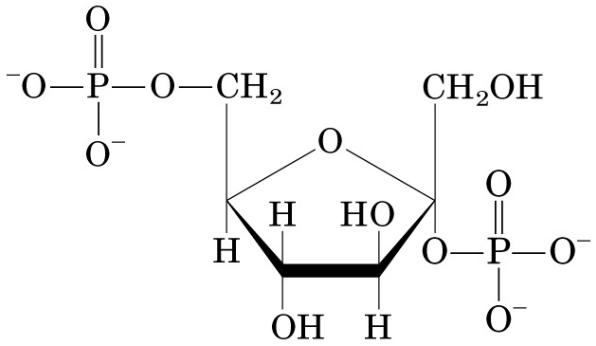


Figure 10.5

Effect of elevated glucagon on the intracellular concentration of fructose 2,6-bisphosphate in the liver. *PFK-2 = phosphofructokinase-2; FBP-2 = Fructose bisphospate phosphatase-2.*

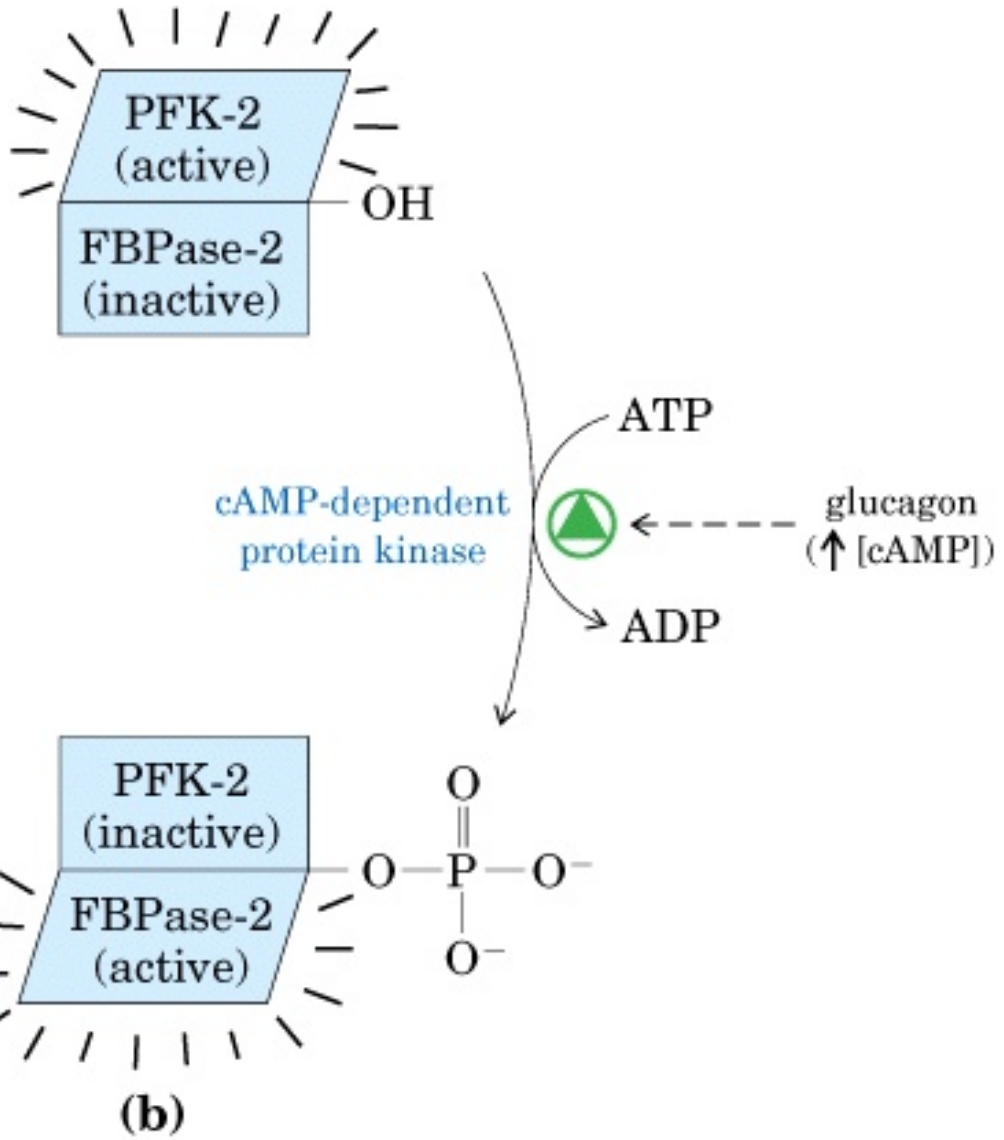




Fructose 2,6 -bisphosphate

↑[Fructose 2,6-bisphosphate]

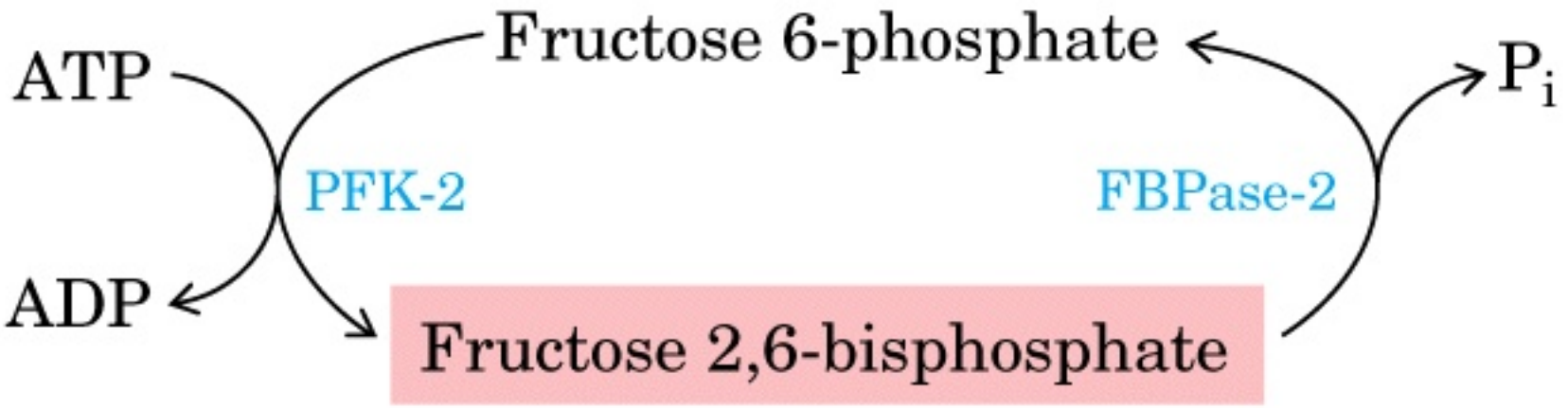
Stimulates glycolysis, inhibits gluconeogenesis



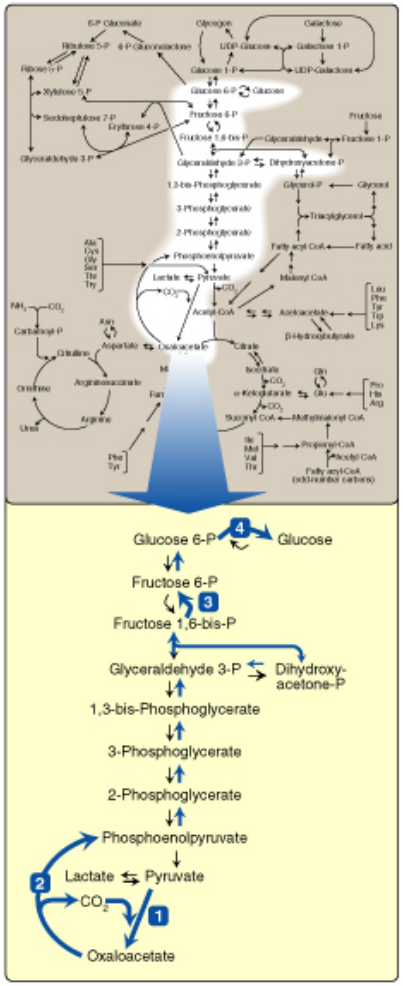
↓[Fructose 2,6-bisphosphate]

Inhibits glycolysis, stimulates gluconeogenesis

(b)


ATP
Fructose 6-phosphate
P_i
PFK-2
FBPase-2
ADP
Fructose 2,6-bisphosphate

(a)



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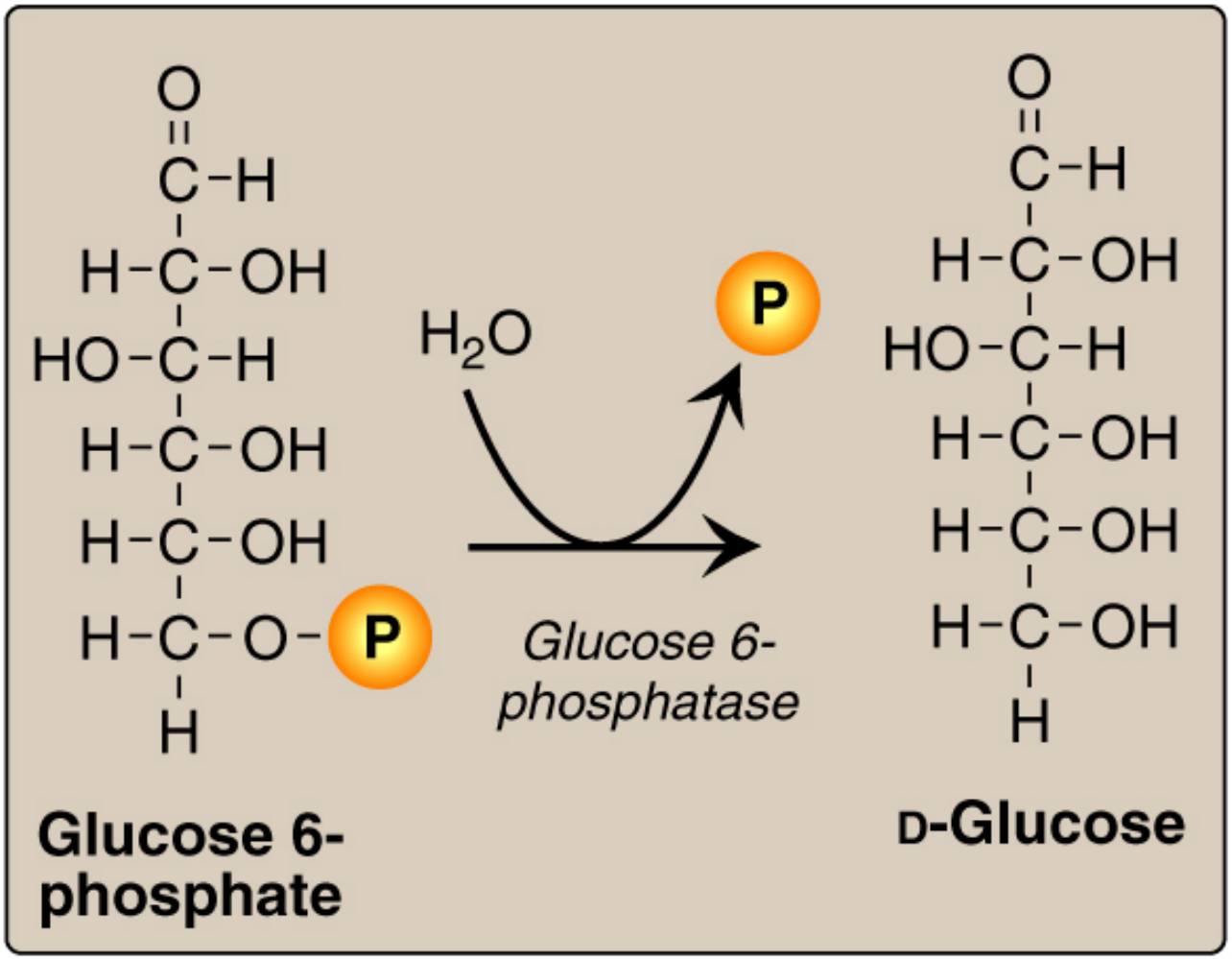


Figure 10.6

Dephosphorylation of glucose 6-phosphate.

This process requieres 2 enzymes. One that translocate the ER known as glucose 6 phosphate translocase and G6P found only in glucogenic cells. This enzyme is also required for the final step of glycogen degradation. Deficiency Responsible for 1a type glycogen storage disease. Von Gierke disease

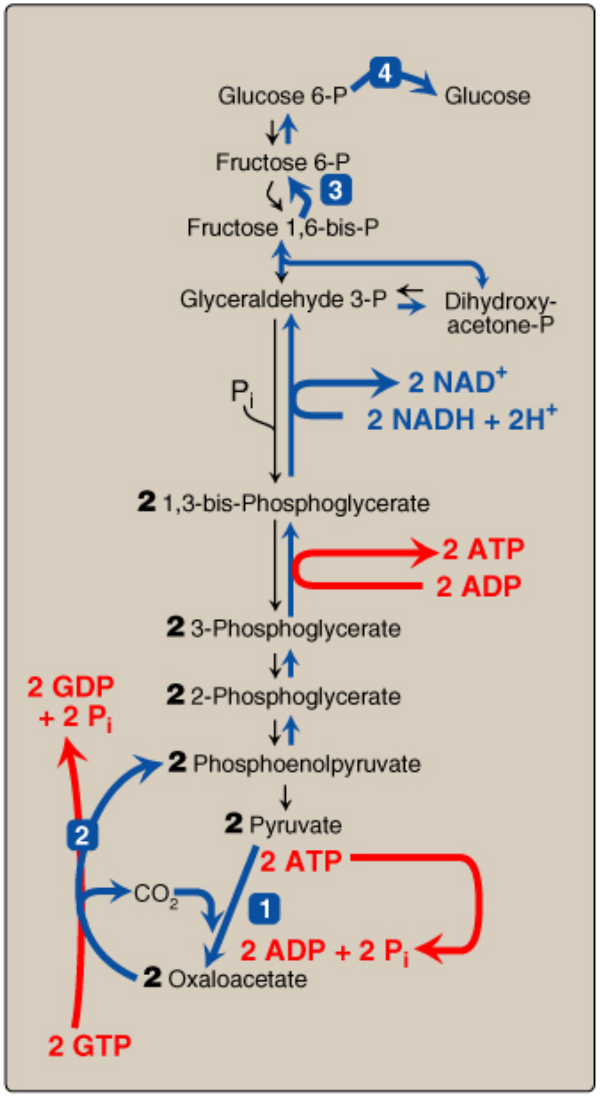


Figure 10.7

Summary of the reactions of glycolysis and gluconeogenesis, showing the energy requirements of gluconeogenesis.

Look for a mistake in this slide

To convert pyruvate to glucose ;11 reactions, 7 reversible 4 irreversible. There are 3 irreversible reactions in glycolysis which are circumvented by which enzymes. One carboxy and decarbolylation. How many high energy phosphates and NADH for a formation of a glucose molecule?

Regulation

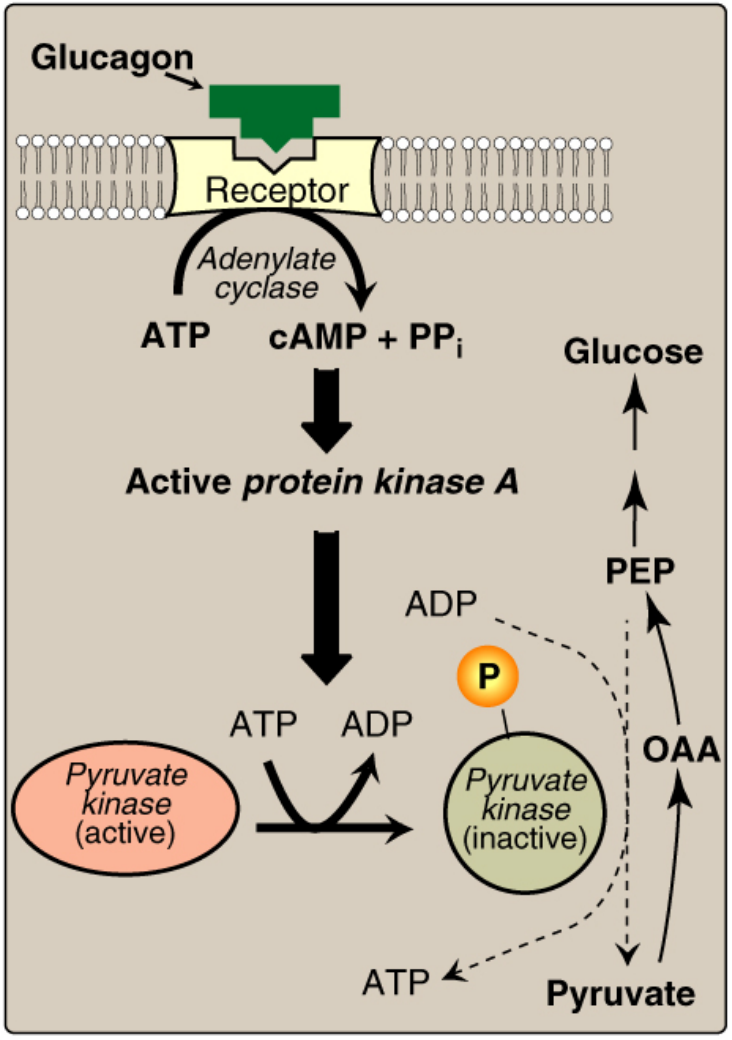
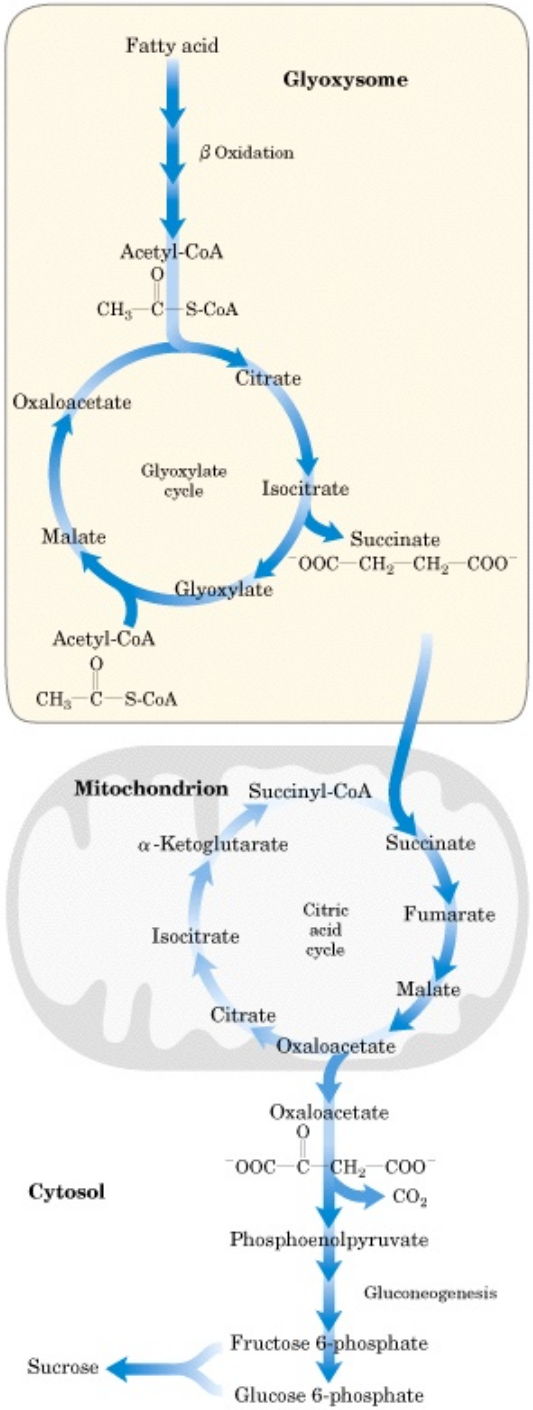
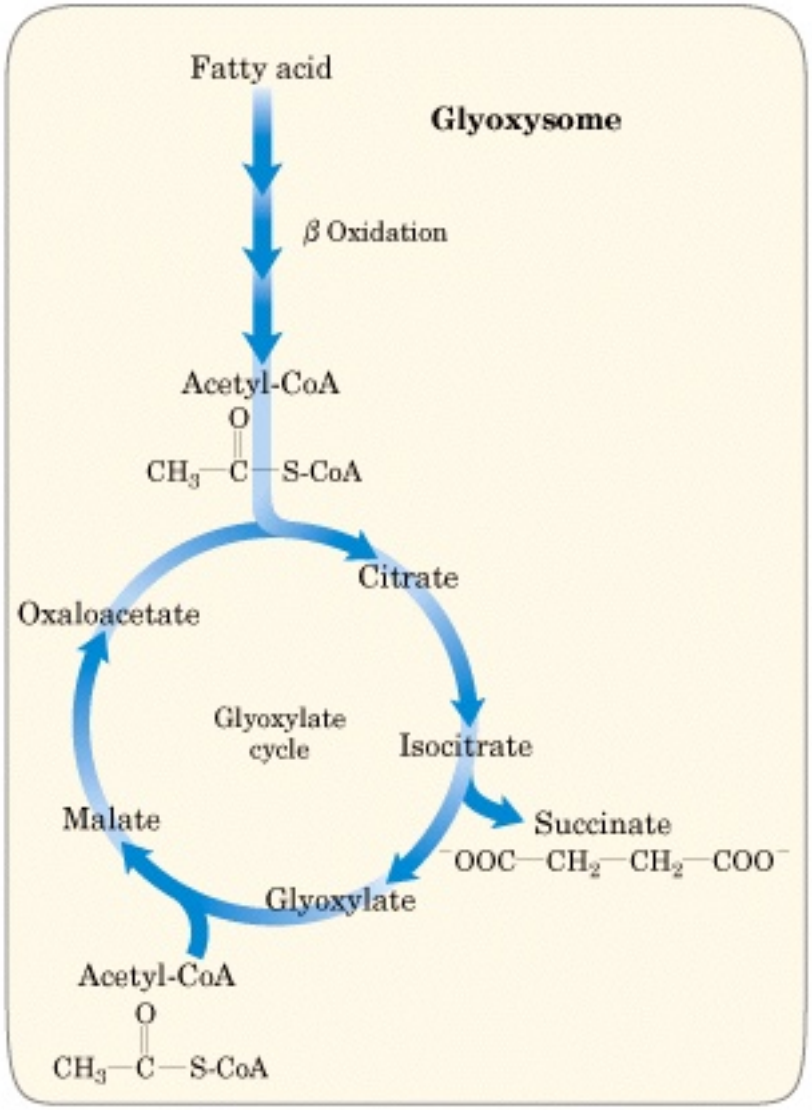


Figure 10.8

Covalent modification of *pyruvate kinase* results in inactivation of the enzyme. OAA = oxaloacetate.


Fatty acid
Glyoxysome
β Oxidation
Acetyl-CoA
O
CH3—C—S-CoA
Citrate
Oxaloacetate
Glyoxylate cycle
Isocitrate
Malate
Succinate
⁻OOC—CH2—CH2—COO⁻
Glyoxylate
Acetyl-CoA
O
CH3—C—S-CoA
Mitochondrion
Succinyl-CoA
α-Ketoglutarate
Succinate
Citric acid cycle
Fumarate
Isocitrate
Malate
Citrate
Oxaloacetate
Oxaloacetate
O
⁻OOC—C—CH2—COO⁻
CO2
Cytosol
Phosphoenolpyruvate
Gluconeogenesis
Fructose 6-phosphate
Sucrose
Glucose 6-phosphate


Fatty acid
Glyoxysome
β Oxidation
Acetyl-CoA
O
CH3—C—S-CoA
Citrate
Oxaloacetate
Glyoxylate cycle
Isocitrate
Malate
Succinate
⁻OOC—CH2—CH2—COO⁻
Glyoxylate
Acetyl-CoA
O
CH3—C—S-CoA

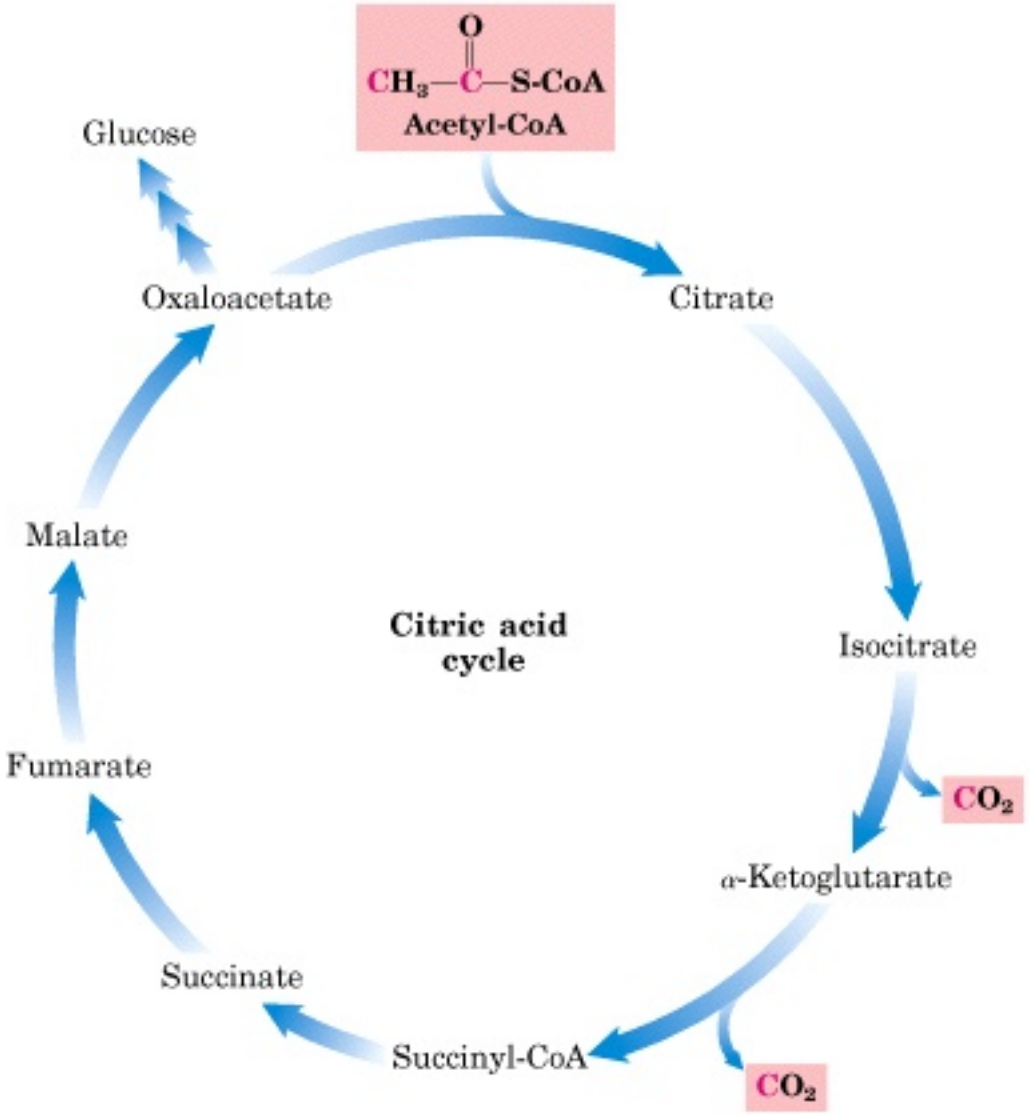

O
CH3—C—S-CoA
Acetyl-CoA
Glucose
Oxaloacetate
Citrate
Isocitrate
CO2
α-Ketoglutarate
Succinyl-CoA
CO2
Succinate
Fumarate
Malate
Citric acid cycle

table 20–3

Glucogenic Amino Acids, Grouped by Site of Entry*

Pyruvate
Alanine
Cysteine
Glycine
Serine
Tryptophan†

α-Ketoglutarate
Arginine
Glutamate
Glutamine
Histidine
Proline

Succinyl-CoA
Isoleucine†
Methionine
Threonine
Valine

Fumarate
Phenylalanine†
Tyrosine†

Oxaloacetate
Asparagine
Aspartate

*These amino acids are precursors of blood glucose or liver glycogen because they can be converted to pyruvate or citric acid cycle intermediates. Only leucine and lysine are unable to furnish carbon for net glucose synthesis.

†These amino acids are also ketogenic (see Fig. 18–19).

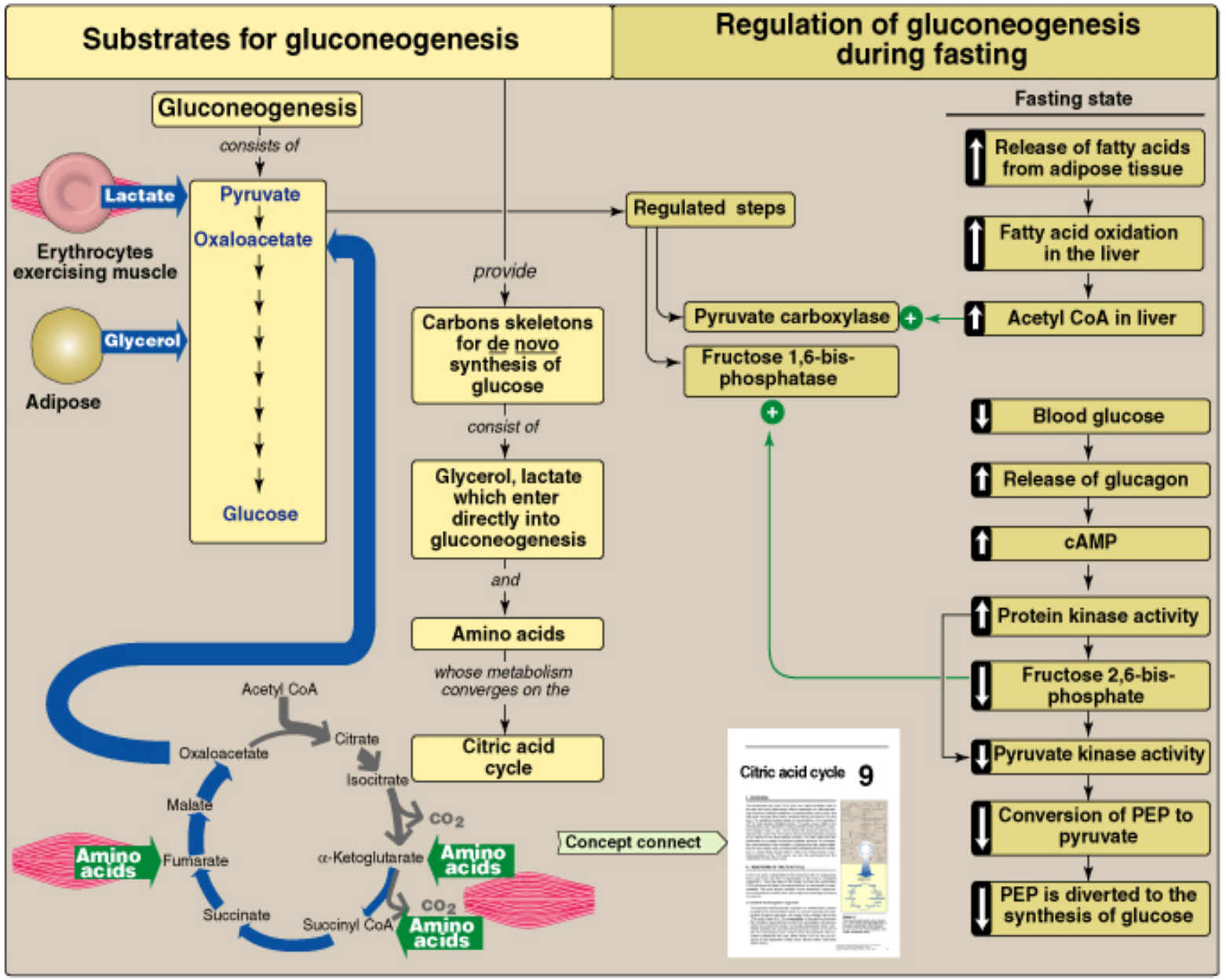


Figure 10.9
Key concept map for gluconeogenesis.