

Hormones/Metabolism: Insulin & Fatty Acid Synthesis



Dr. Phillip Carpenter
medpathwaymcat

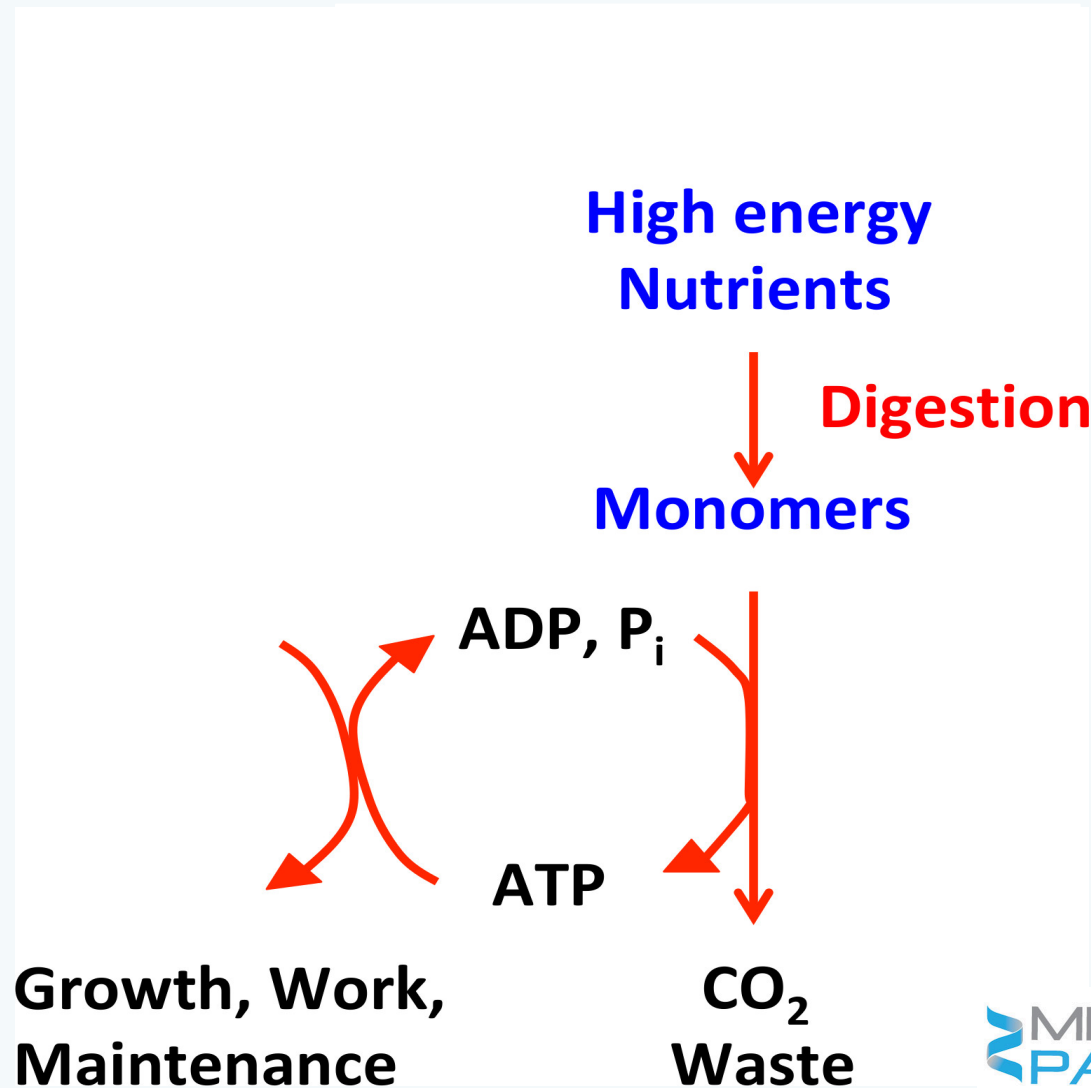


Med-pathway



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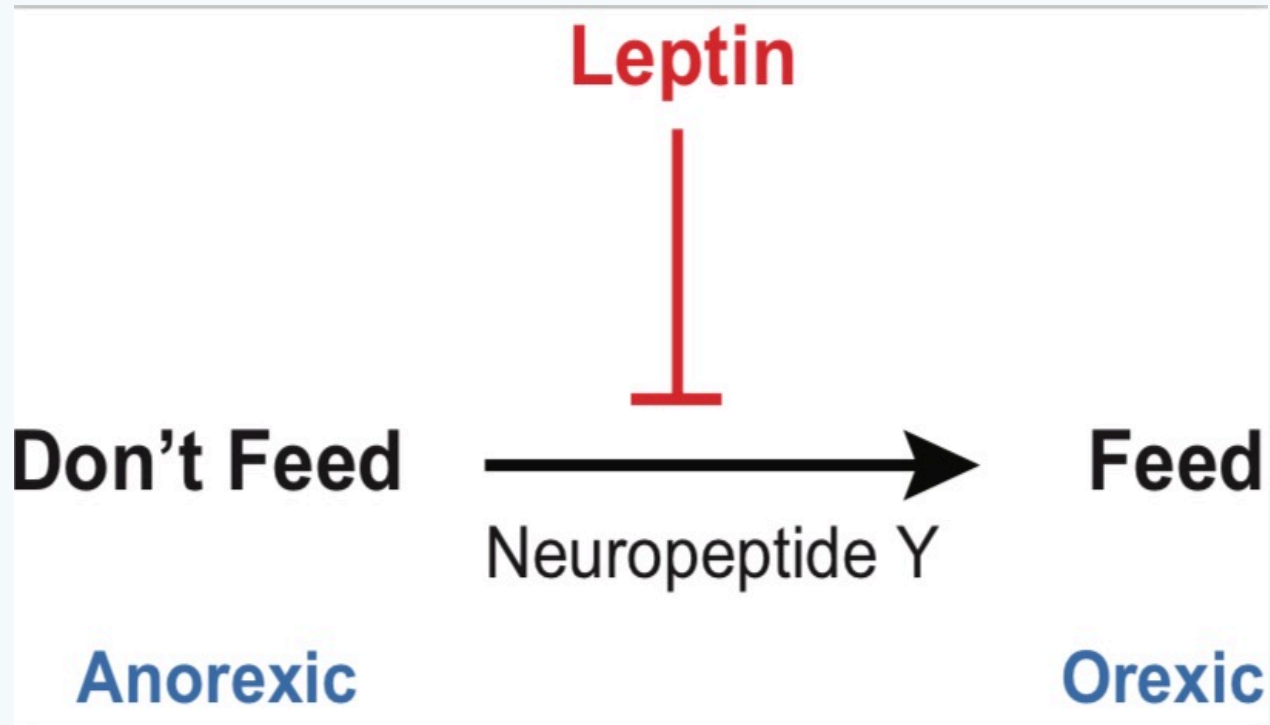
Metabolism Overview



MAJOR METABOLIC HORMONES

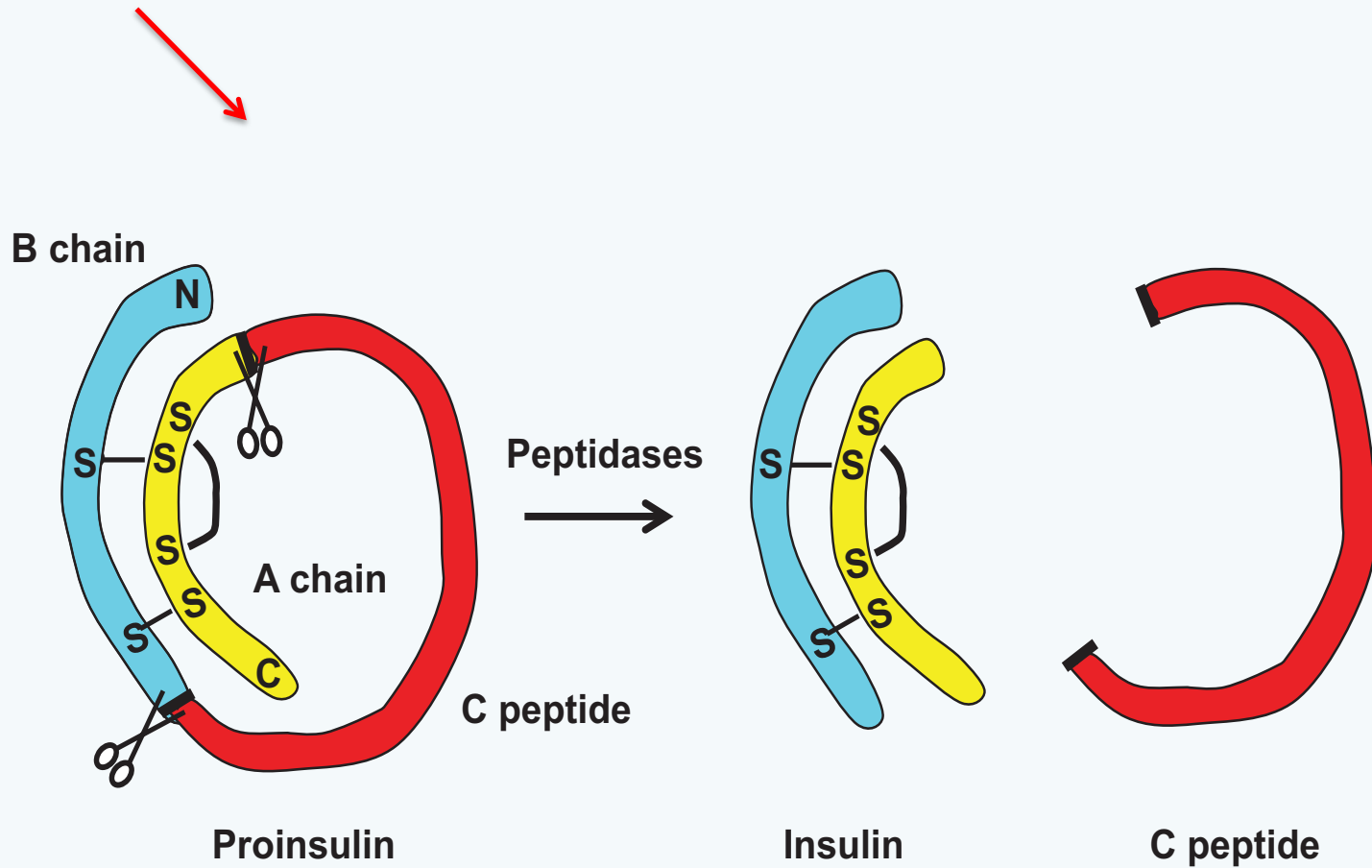
Hormone	Site of release	Target Tissue(s)	Biochemical Effects
Insulin	Pancreatic β cells	Widespread	↓ Glycemia ↑ Fat, Glycogen, Proteins
Glucagon	Pancreatic α cells	Liver	↑ Glycemia, Gluconeogenesis
Epinephrine	Adrenal medulla	Widespread	↑ Glycemia: Gluconeogenesis, Glycogen degradation, Triglyceride mobilization
Cortisol	Adrenal cortex	Widespread	↑ Glycemia, Protein breakdown

Leptin & Neuropeptide Y

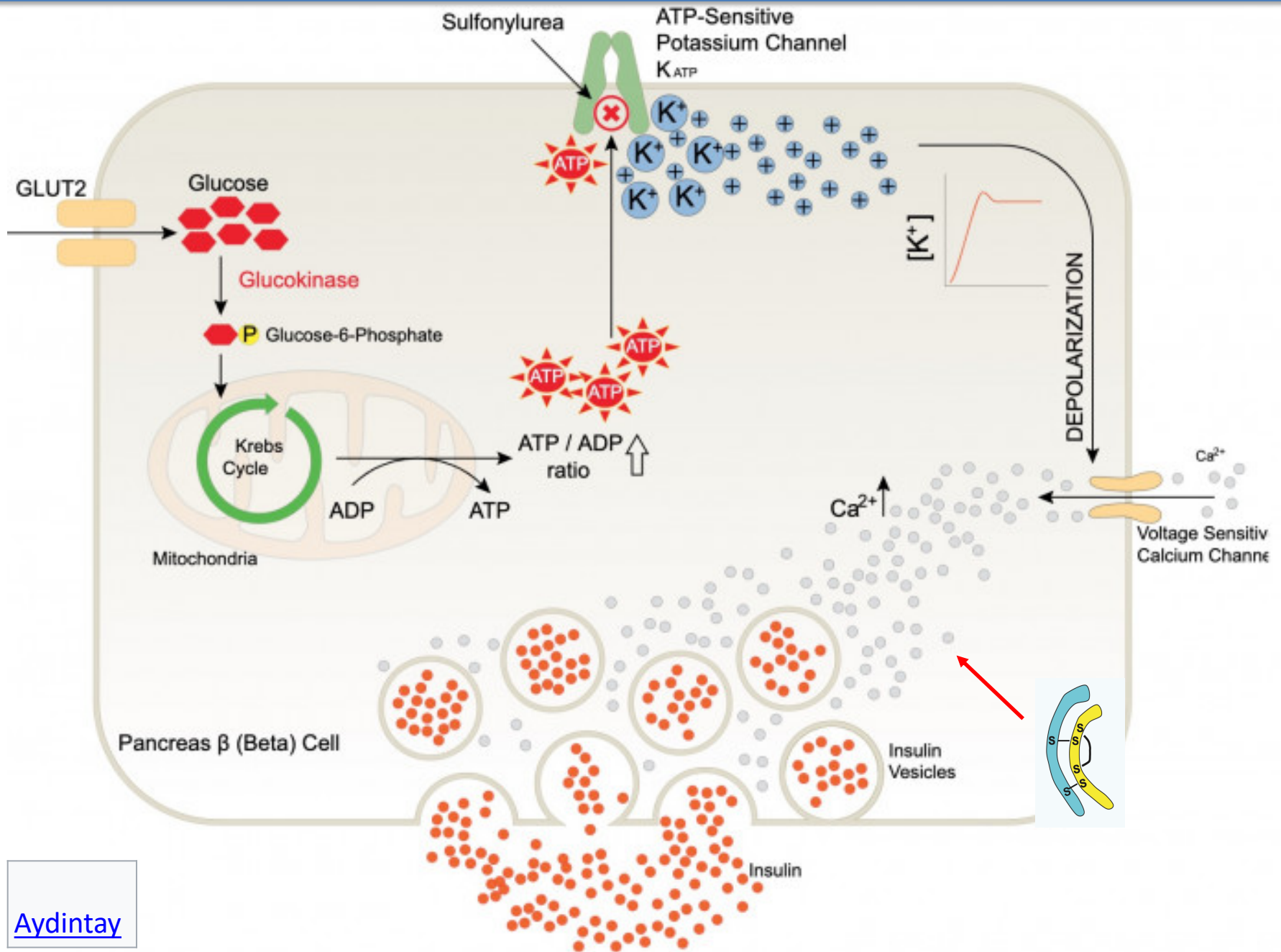


Insulin Processing

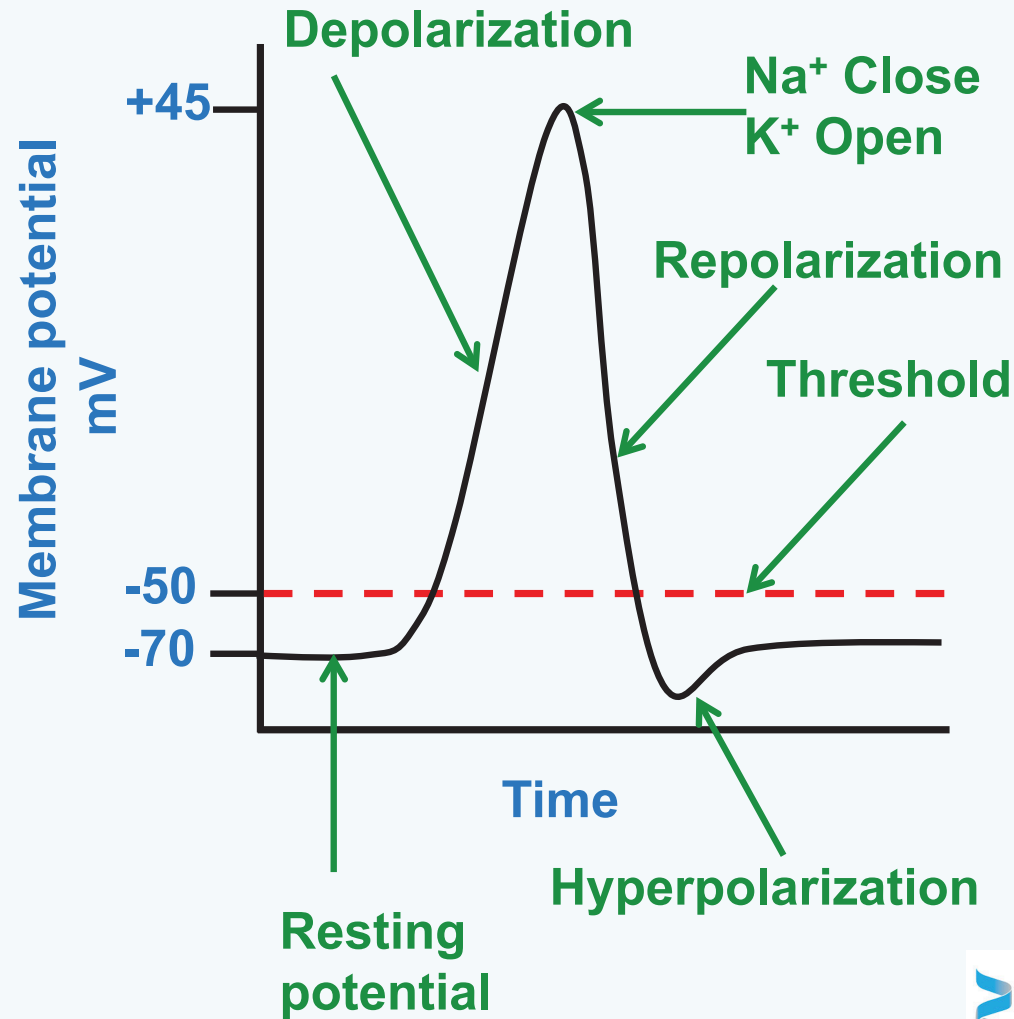
Preproinsulin



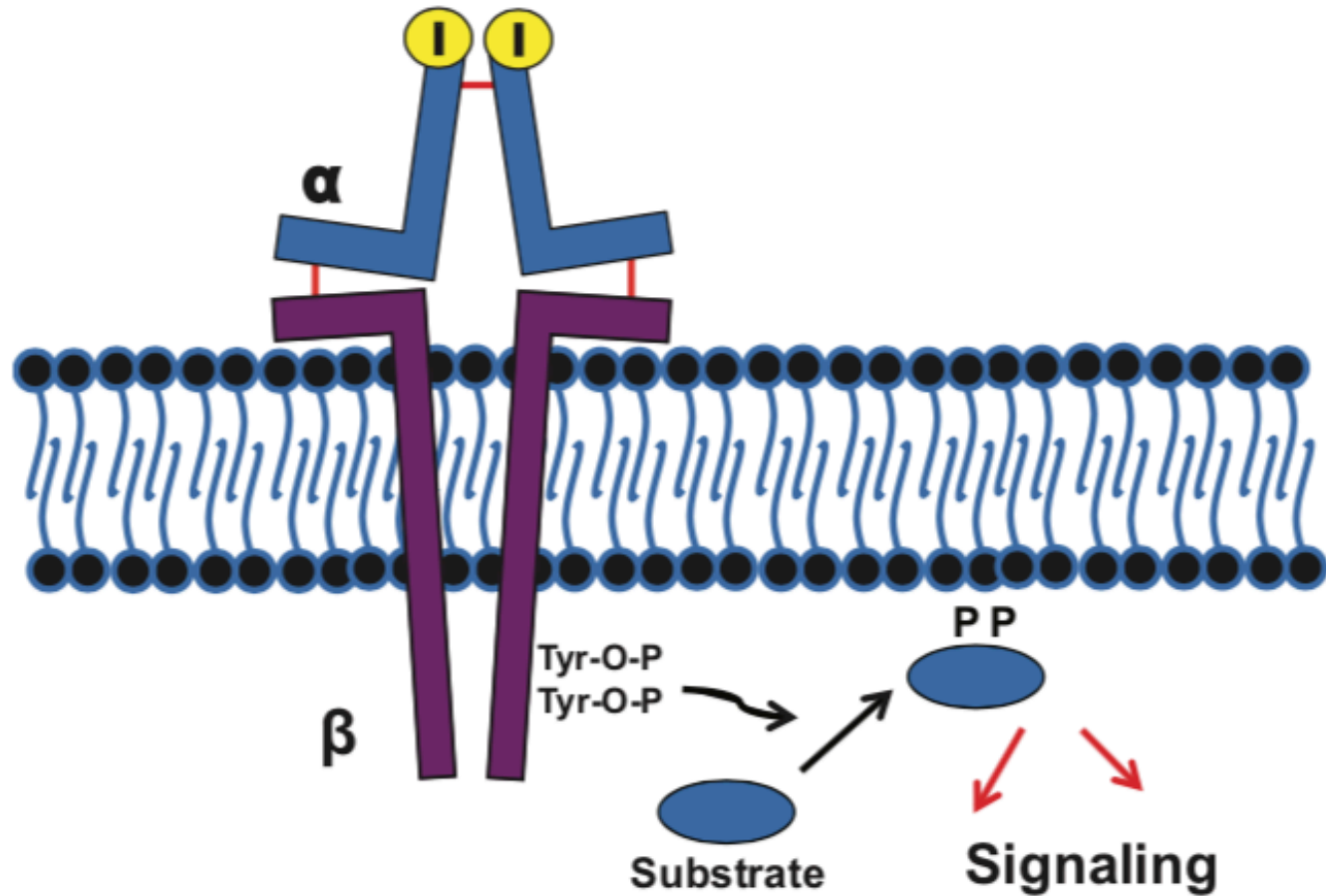
Insulin Processing



Membrane Depolarization in Neuronal Cells



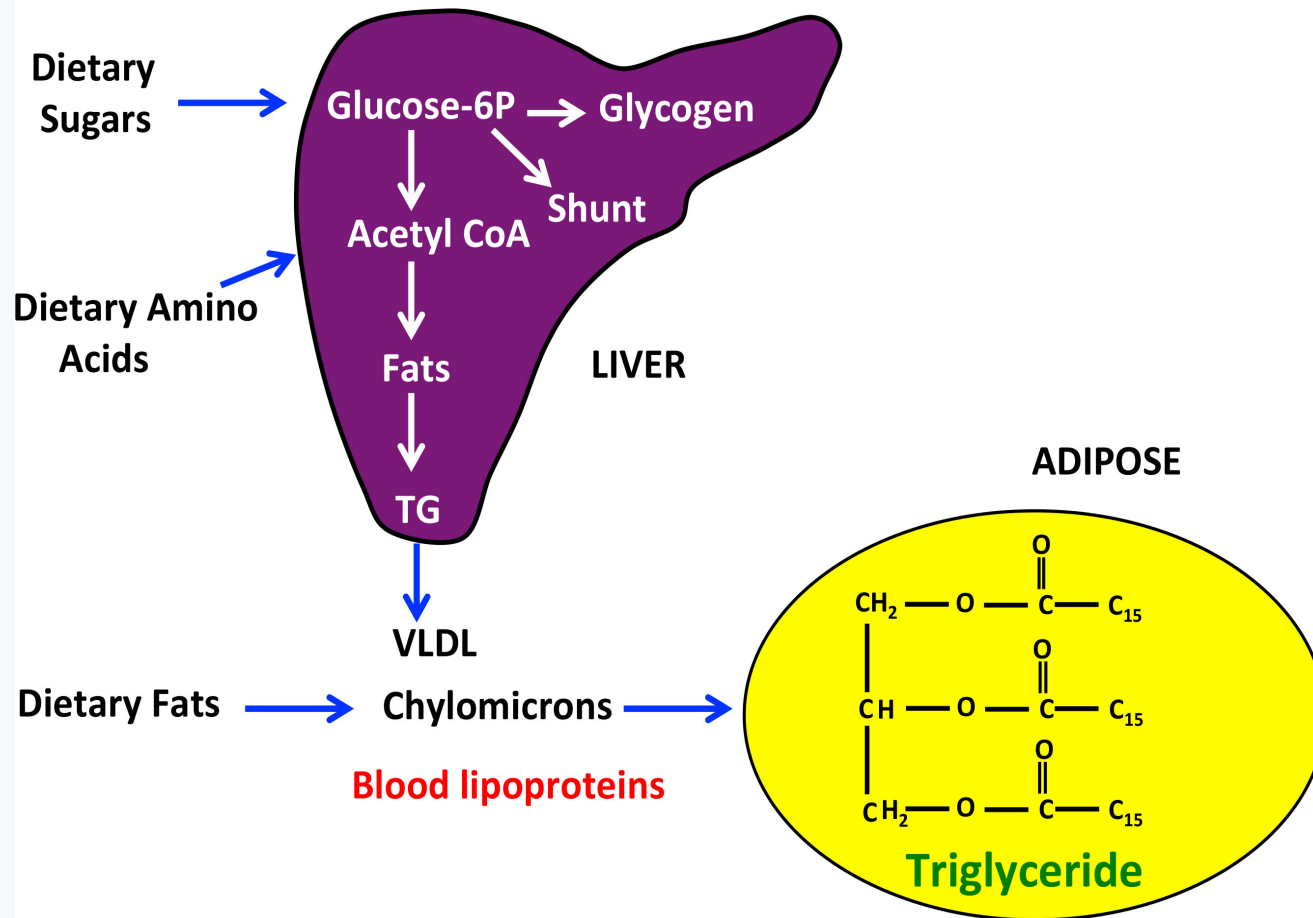
Insulin Receptor



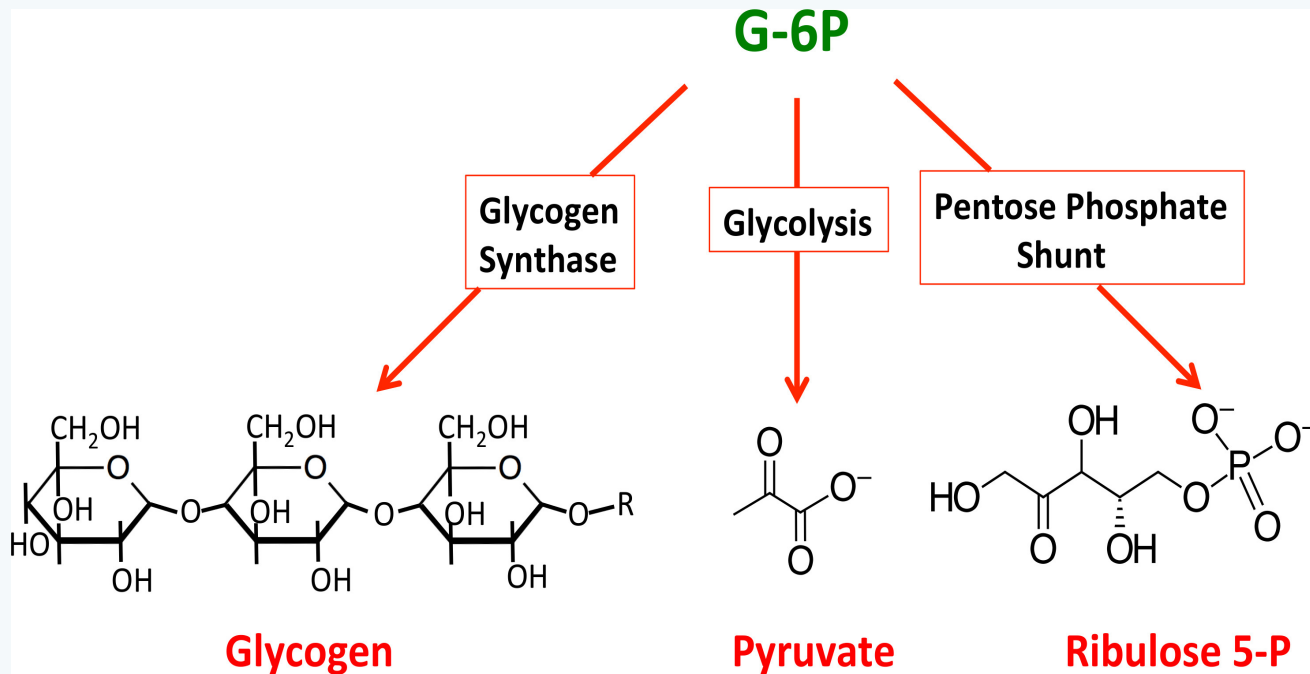
Glucose Transport
Glycolysis
Protein Synthesis

Insulin Promotes Anabolism

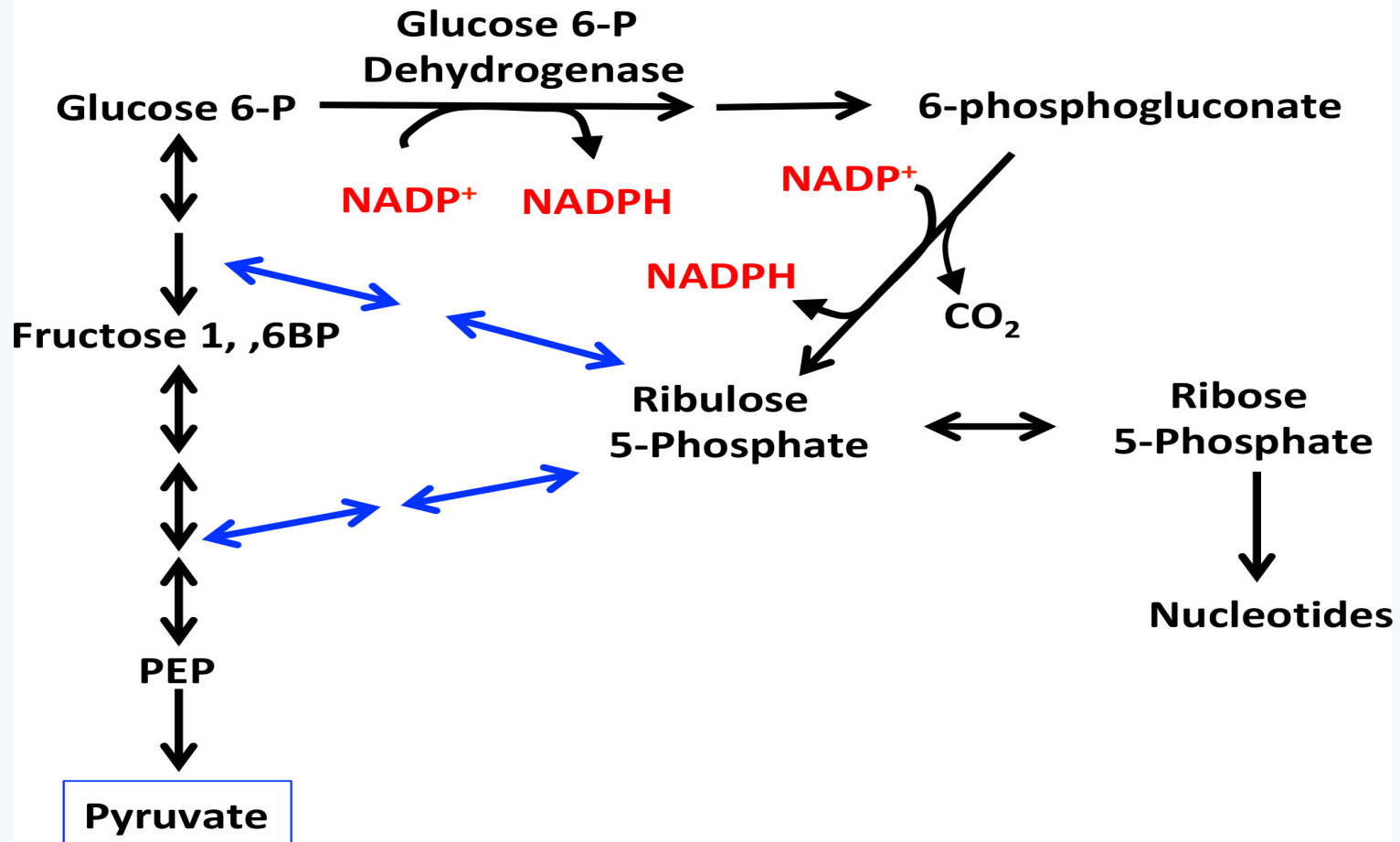
Coordination of biochemical pathways in the “Fed State”



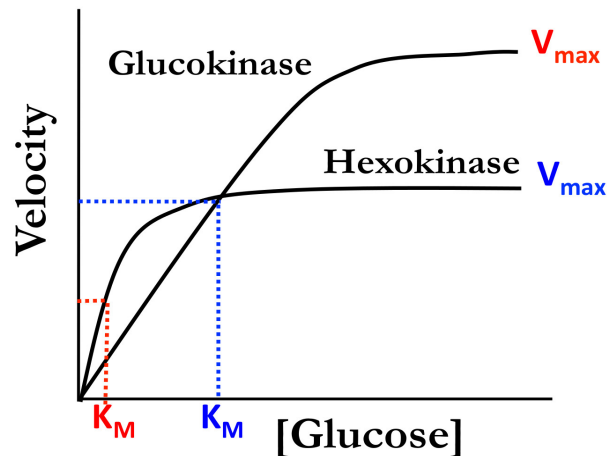
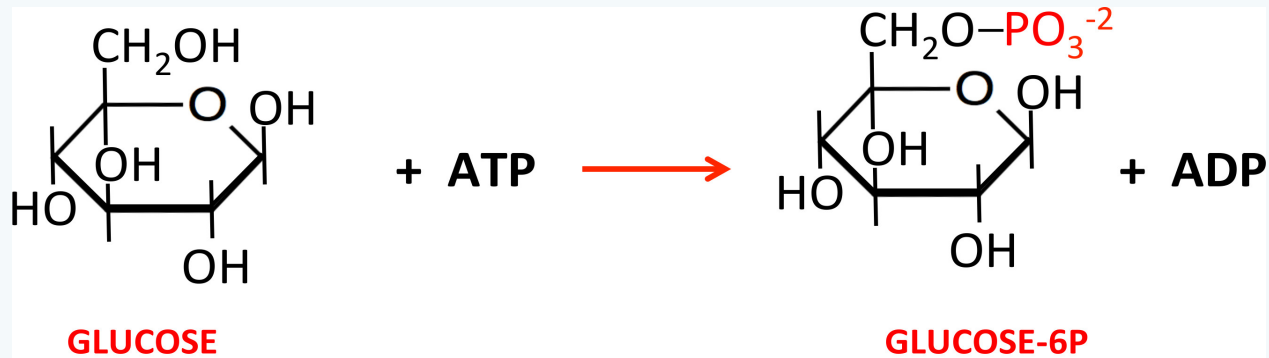
3 Fates of Glucose-6P



The Pentose Phosphate Shunt

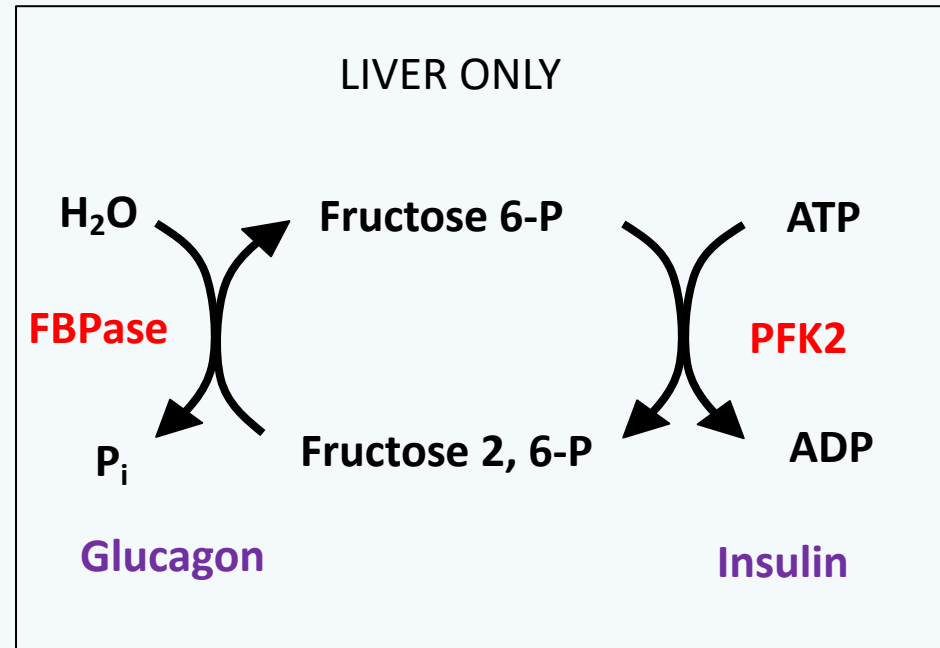
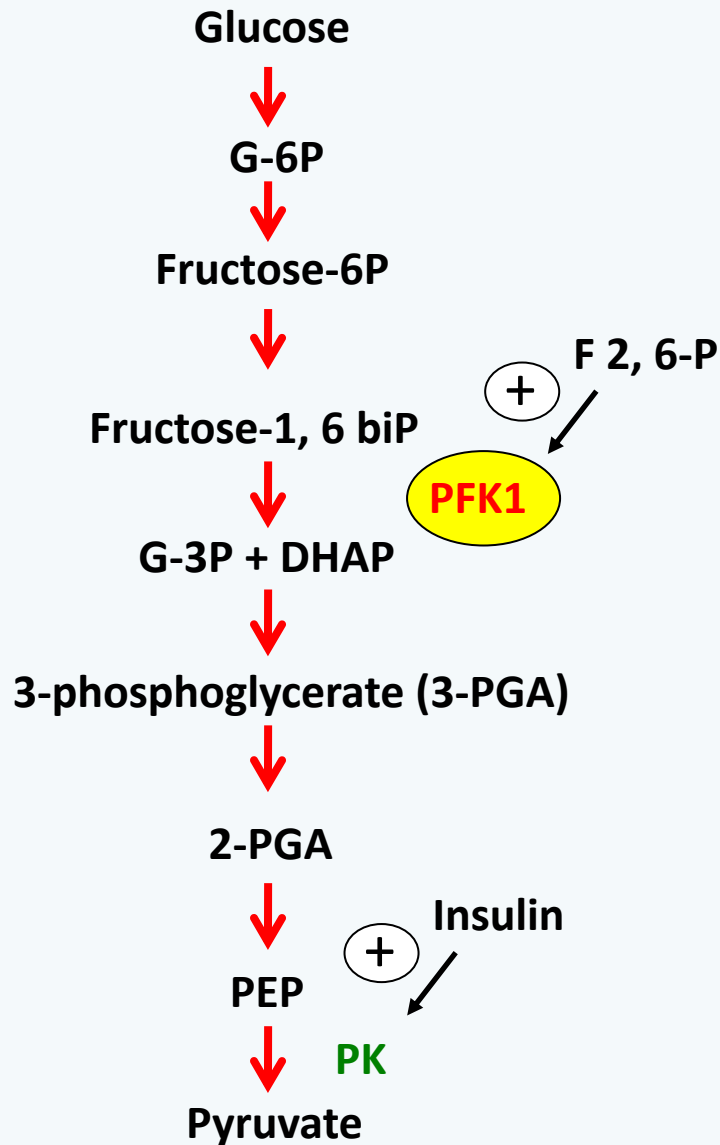


Hexokinase vs Glucokinase

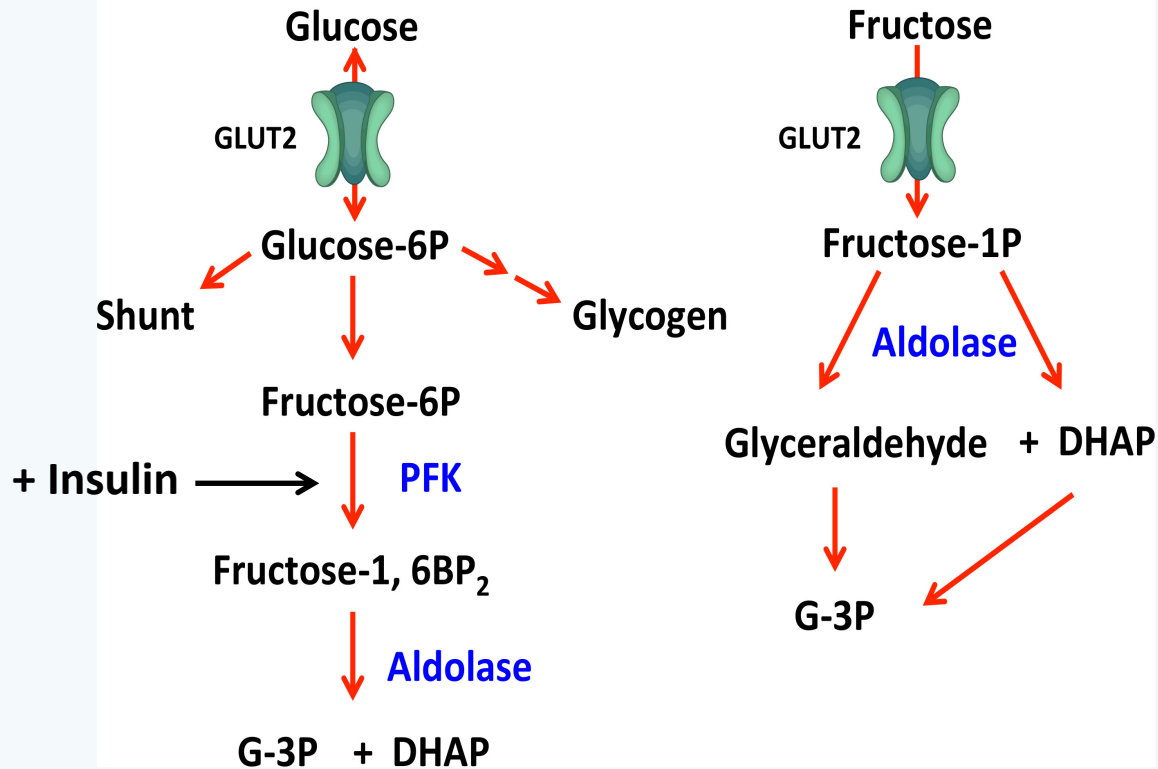


Hexokinase: End Product Inhibition (Muscle)
Glucokinase: No End Product Inhibition (Liver)

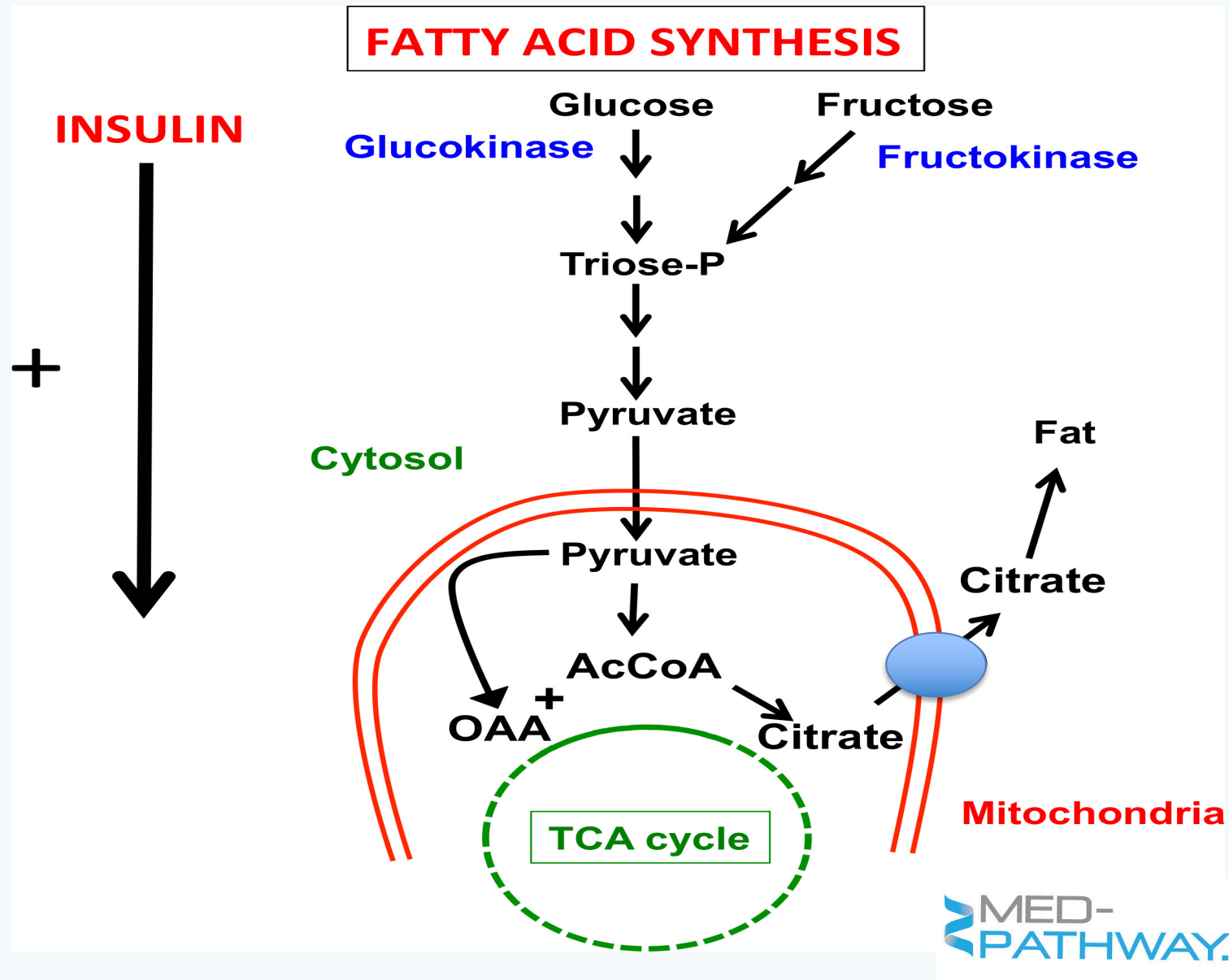
Insulin & Glycolysis



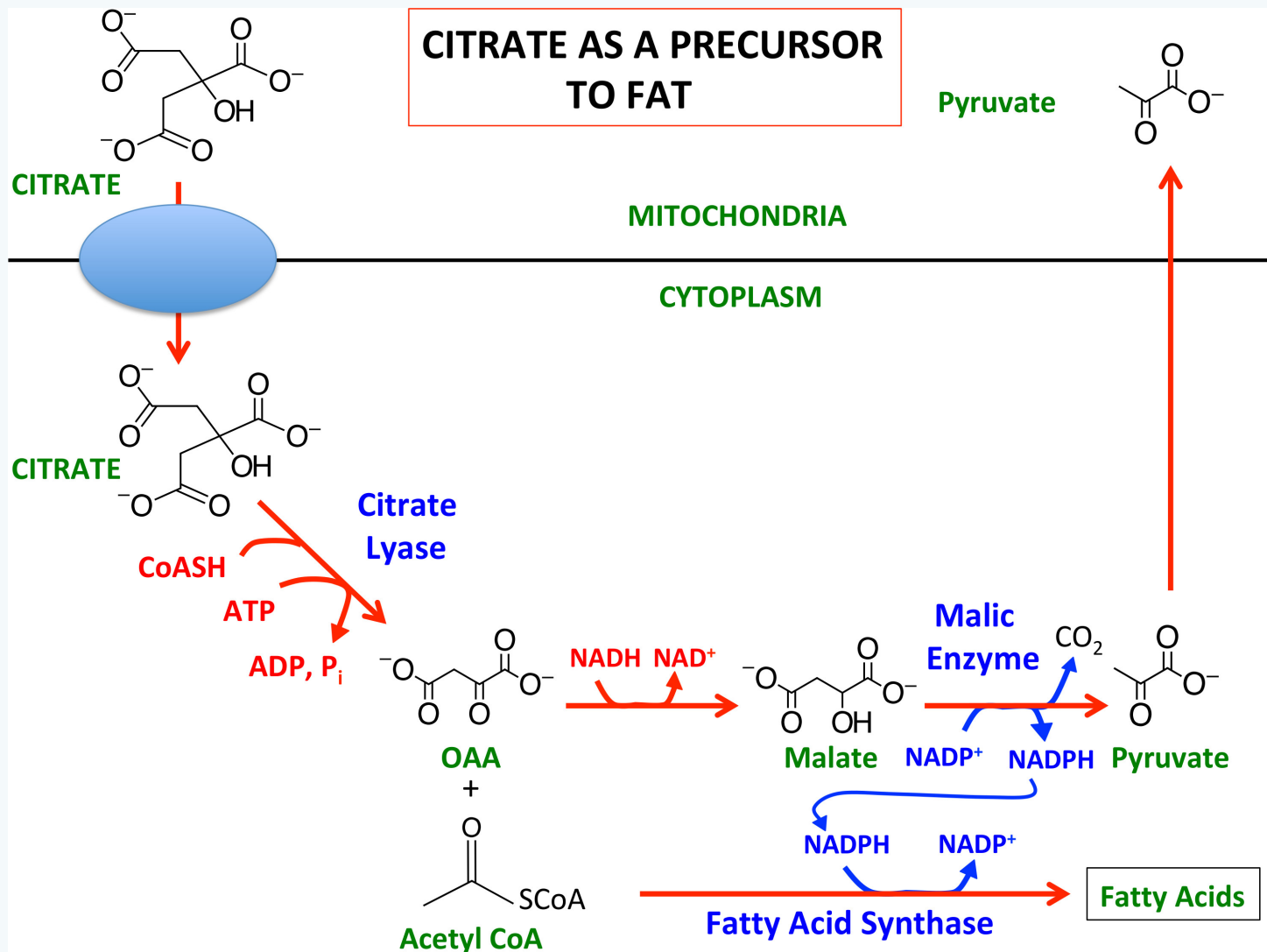
Fructose vs Glucose



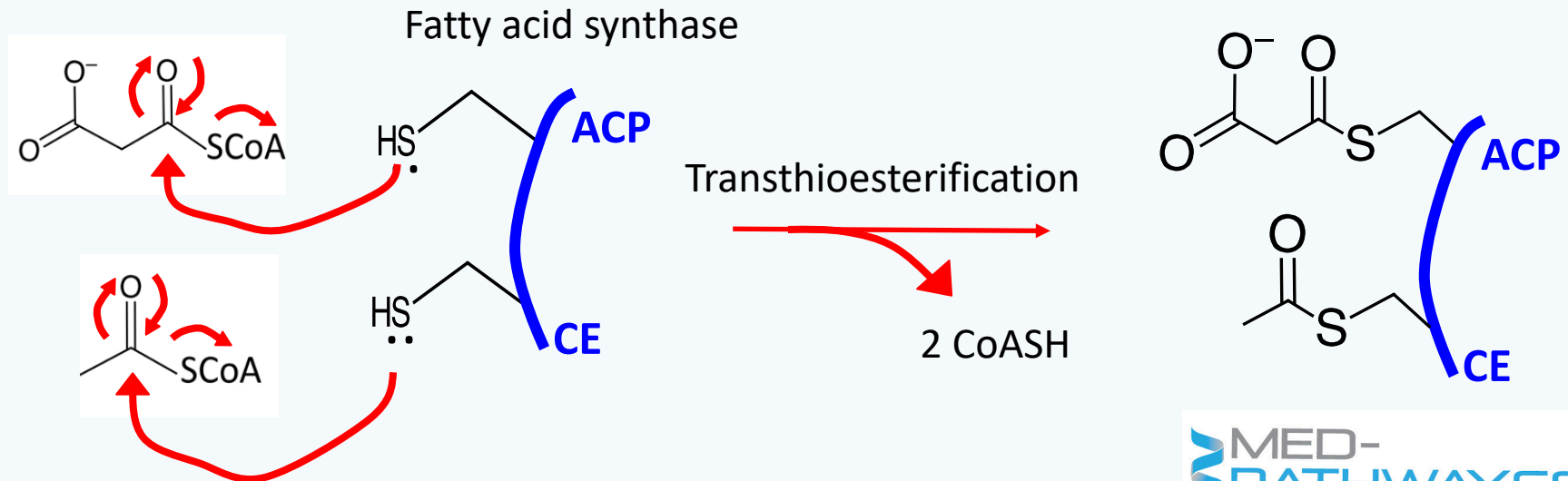
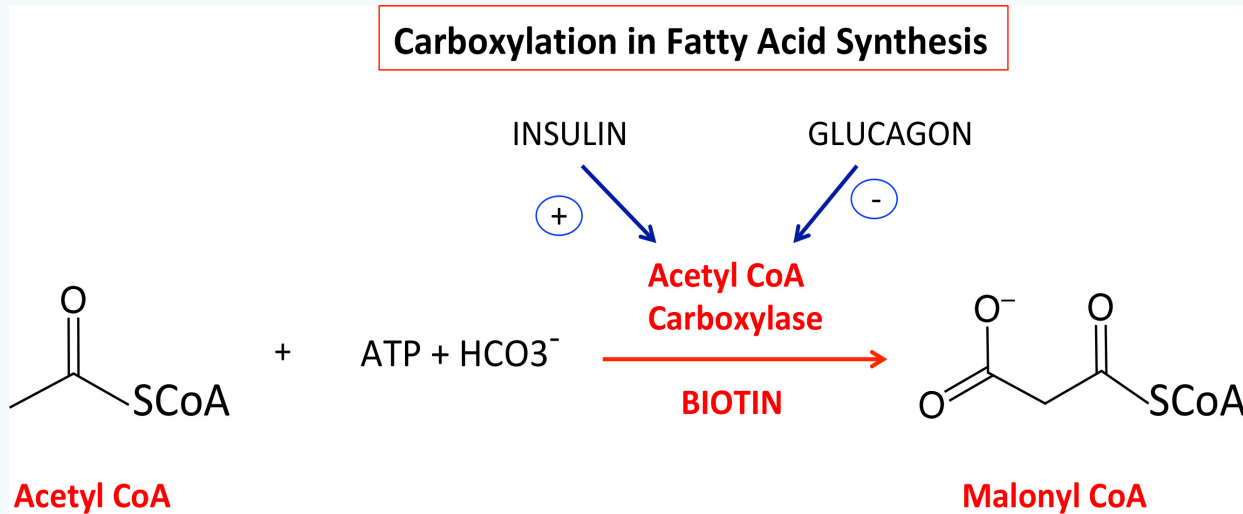
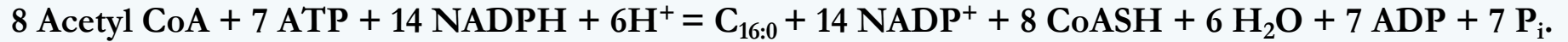
The Role of the TCA cycle in Fat Synthesis



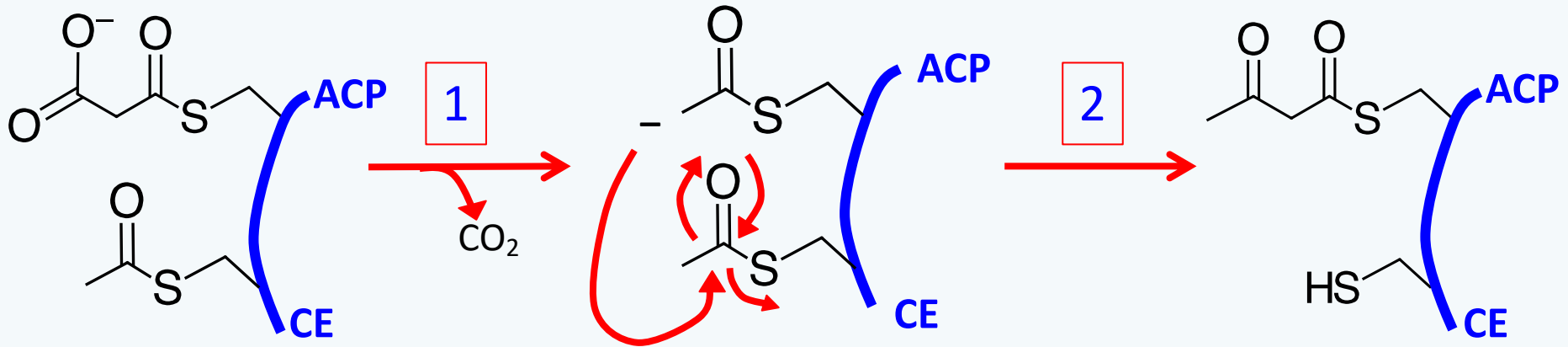
The Fate of Cytoplasmic Citrate



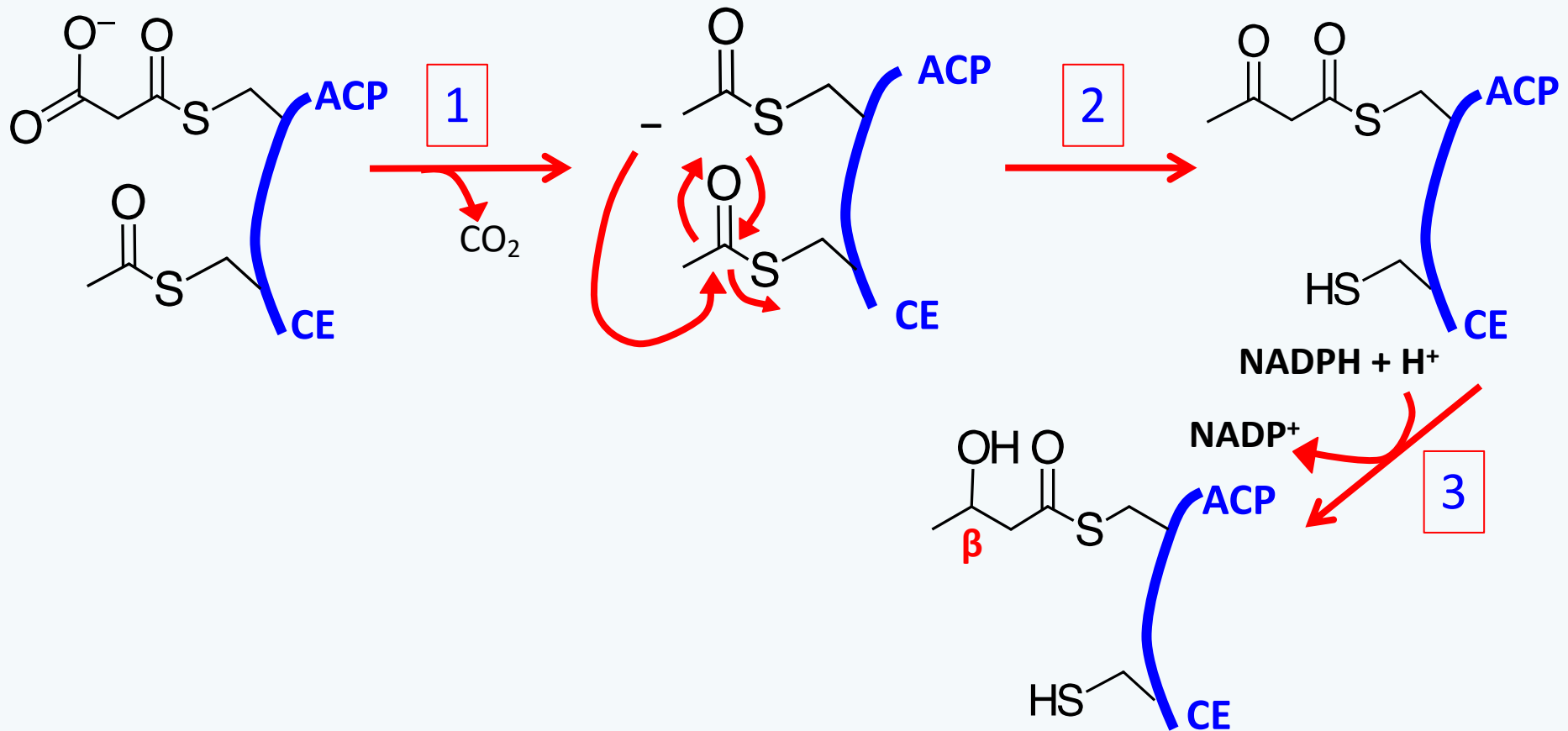
Fatty Acid Synthase



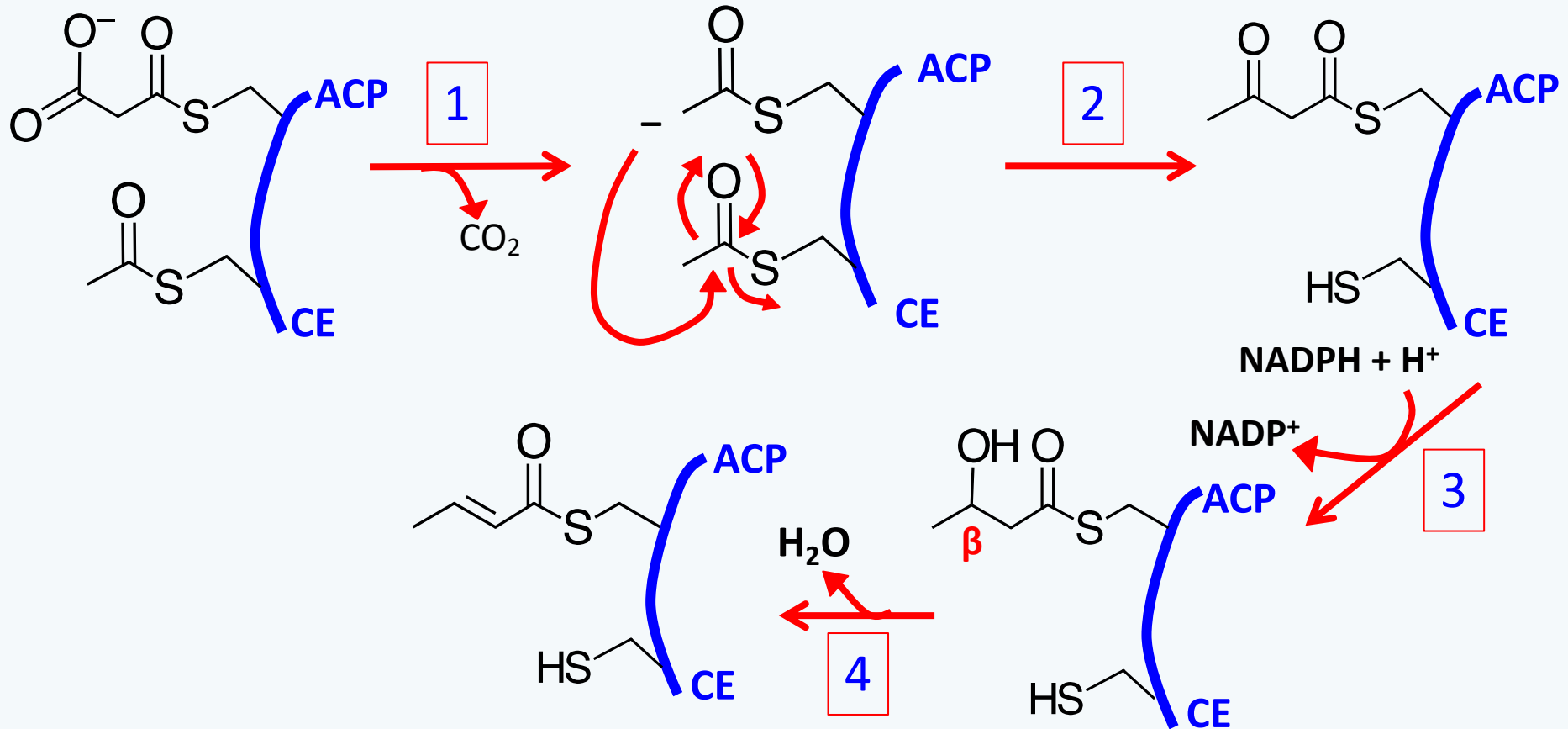
Fatty Acid Synthase



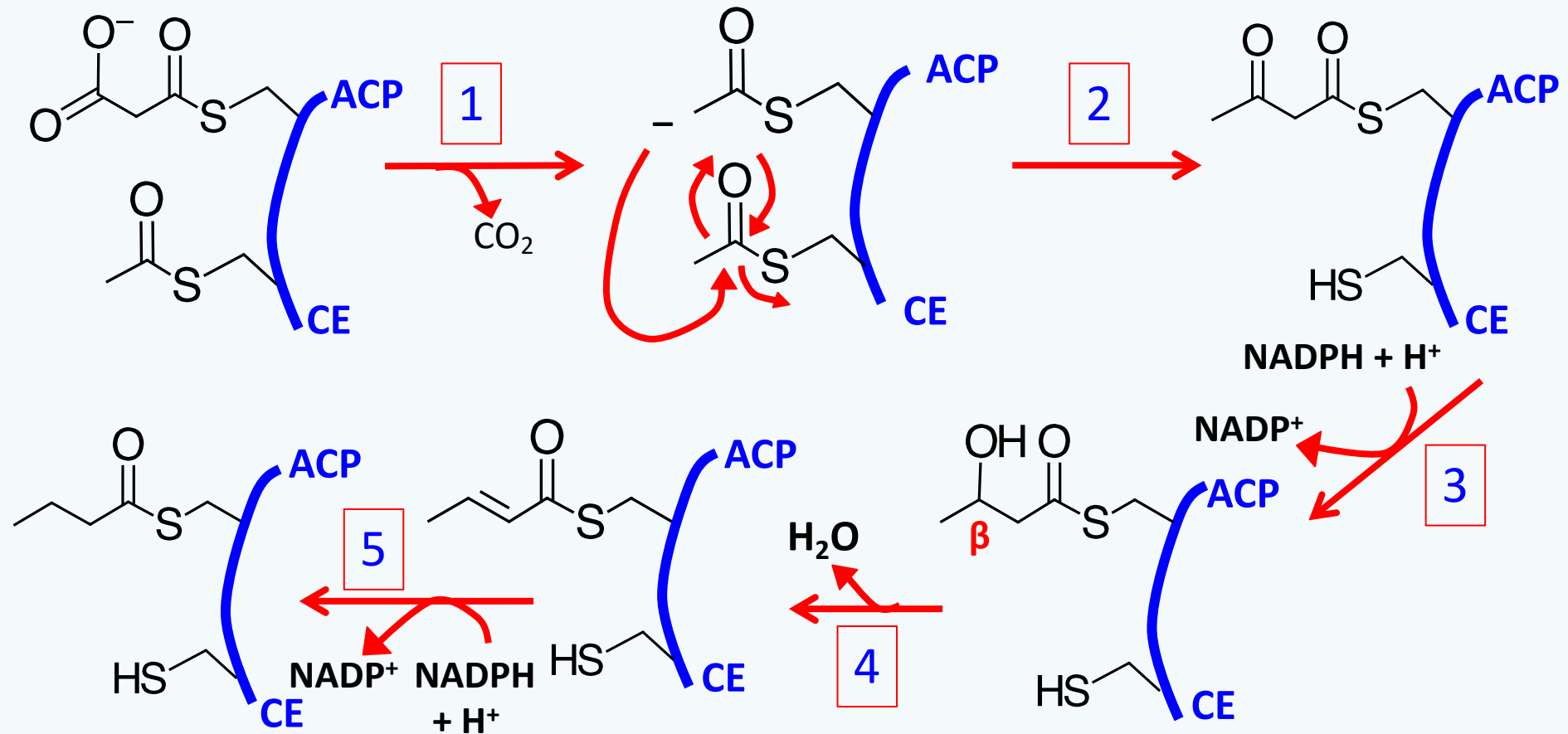
Fatty Acid Synthase



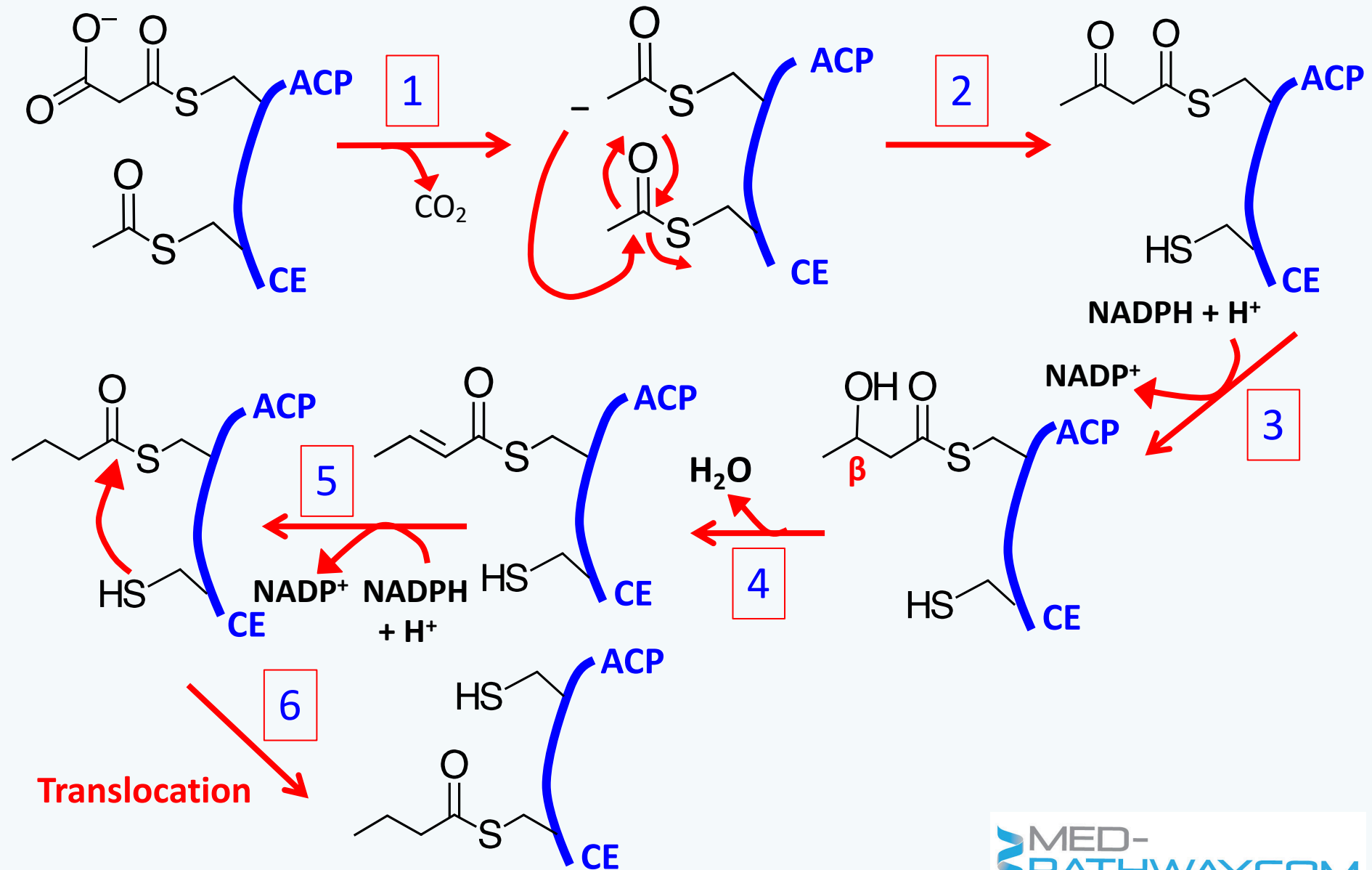
Fatty Acid Synthase



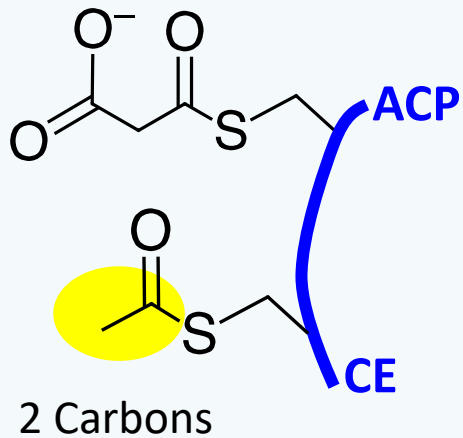
Fatty Acid Synthase



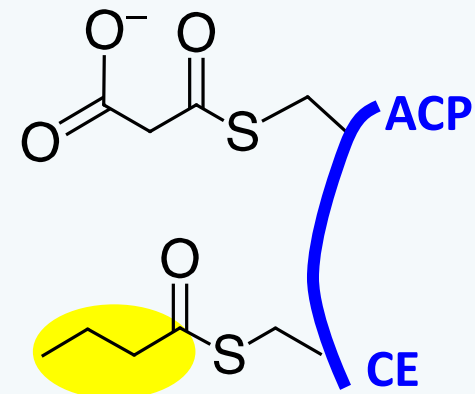
Fatty Acid Synthase



Fatty Acid Synthase



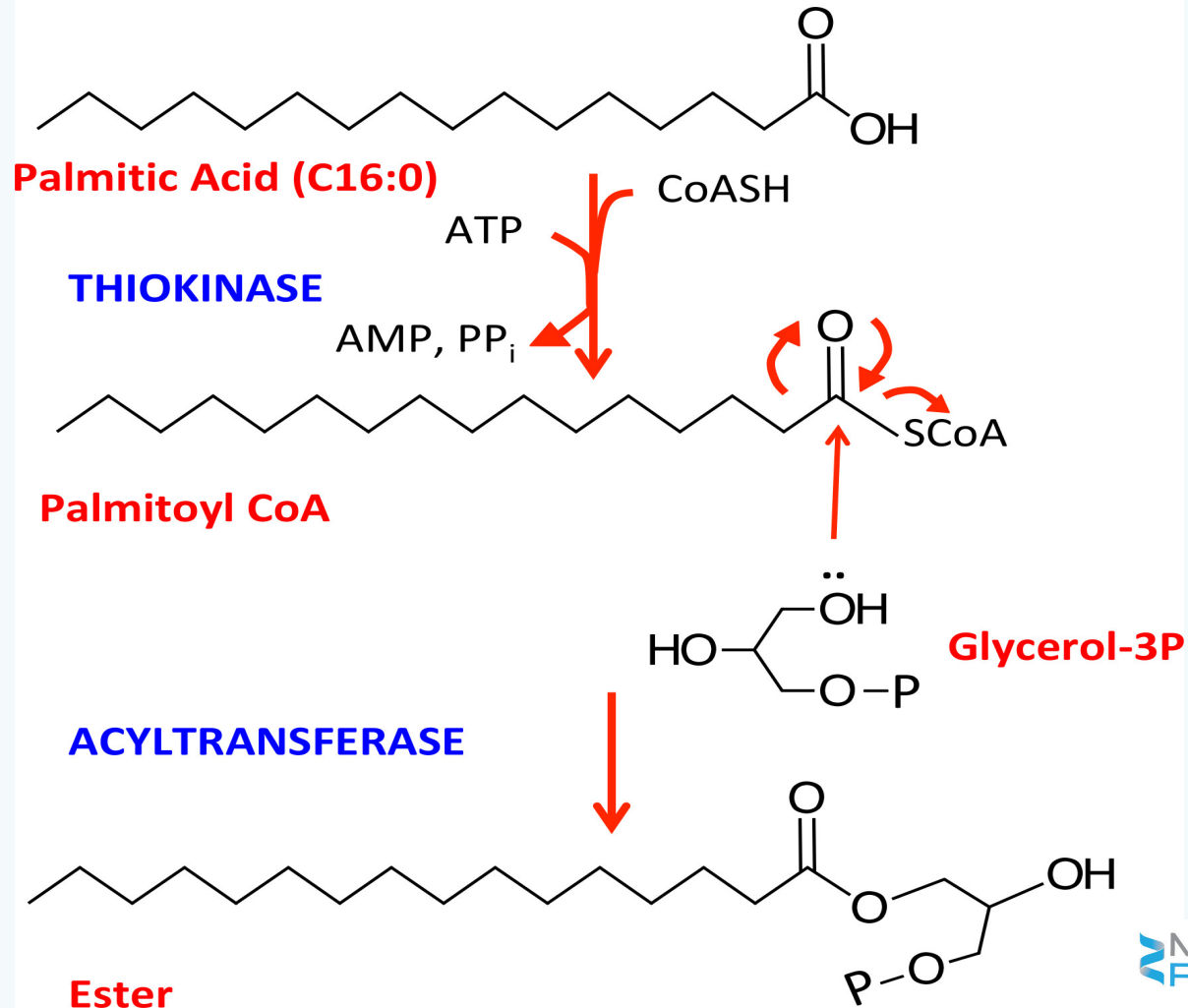
β Reduction



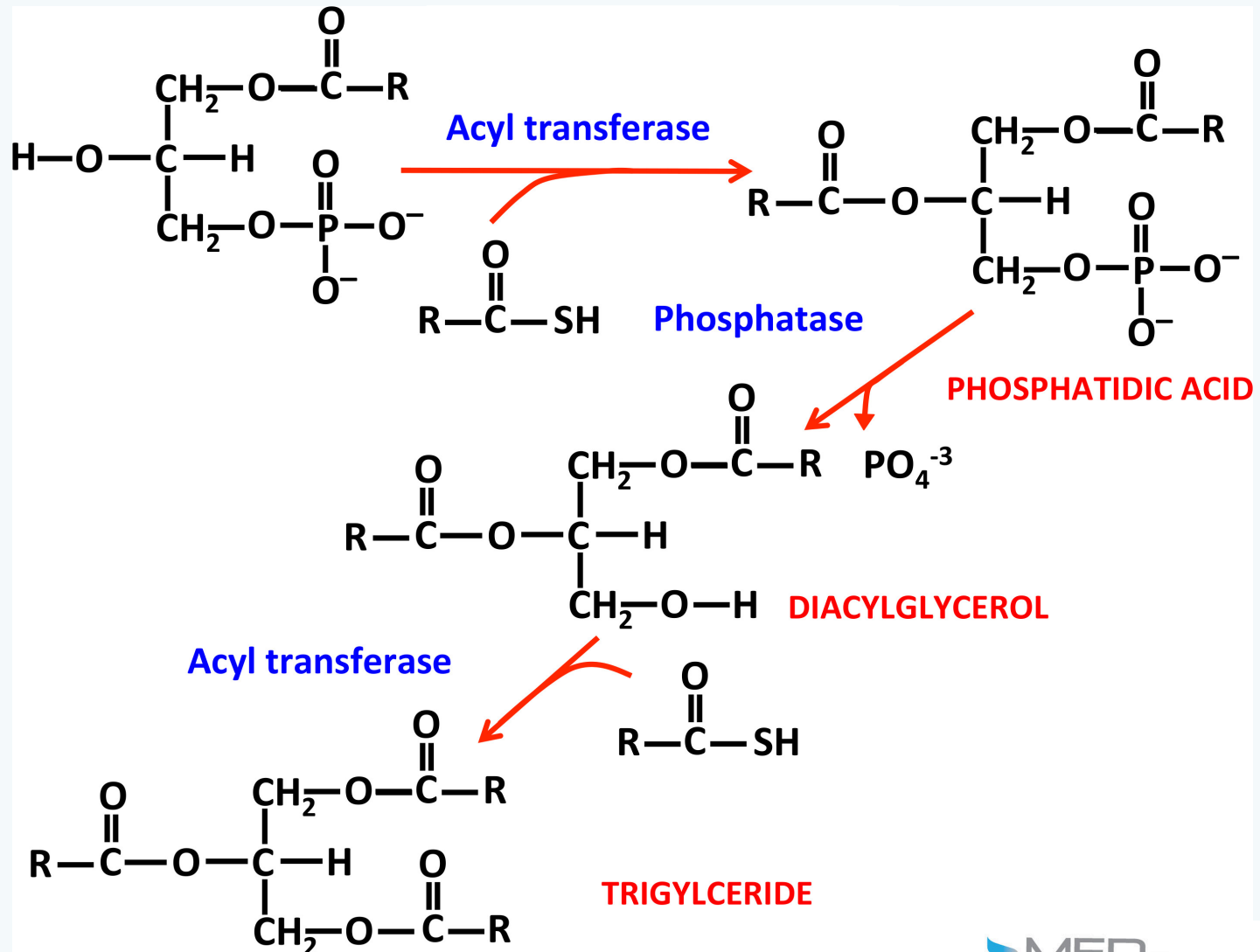
C 16:0 Palmitic Acid

←

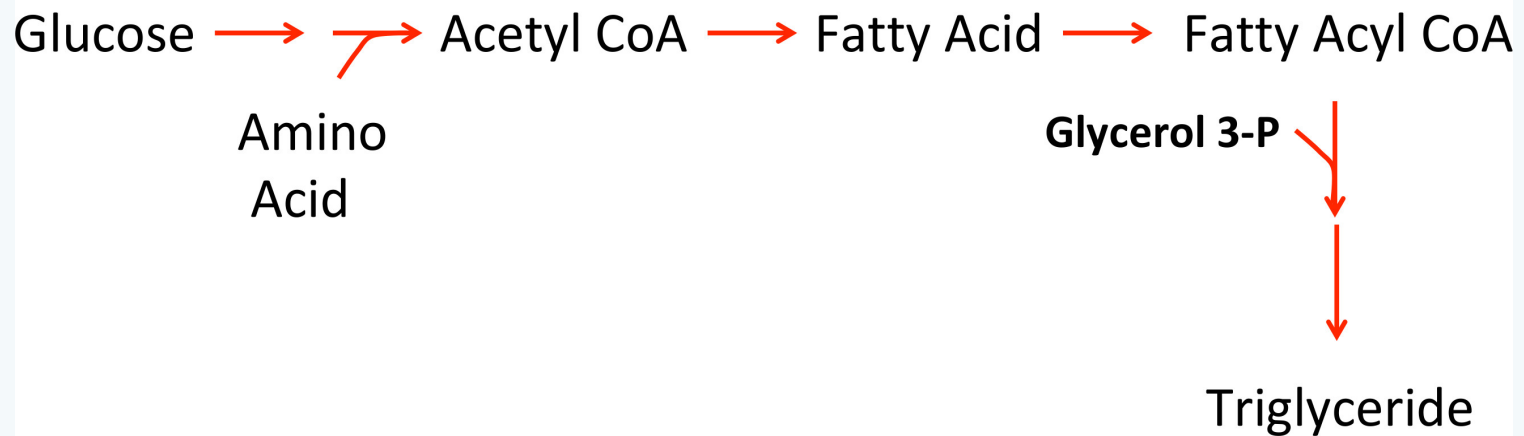
Triglyceride Synthesis



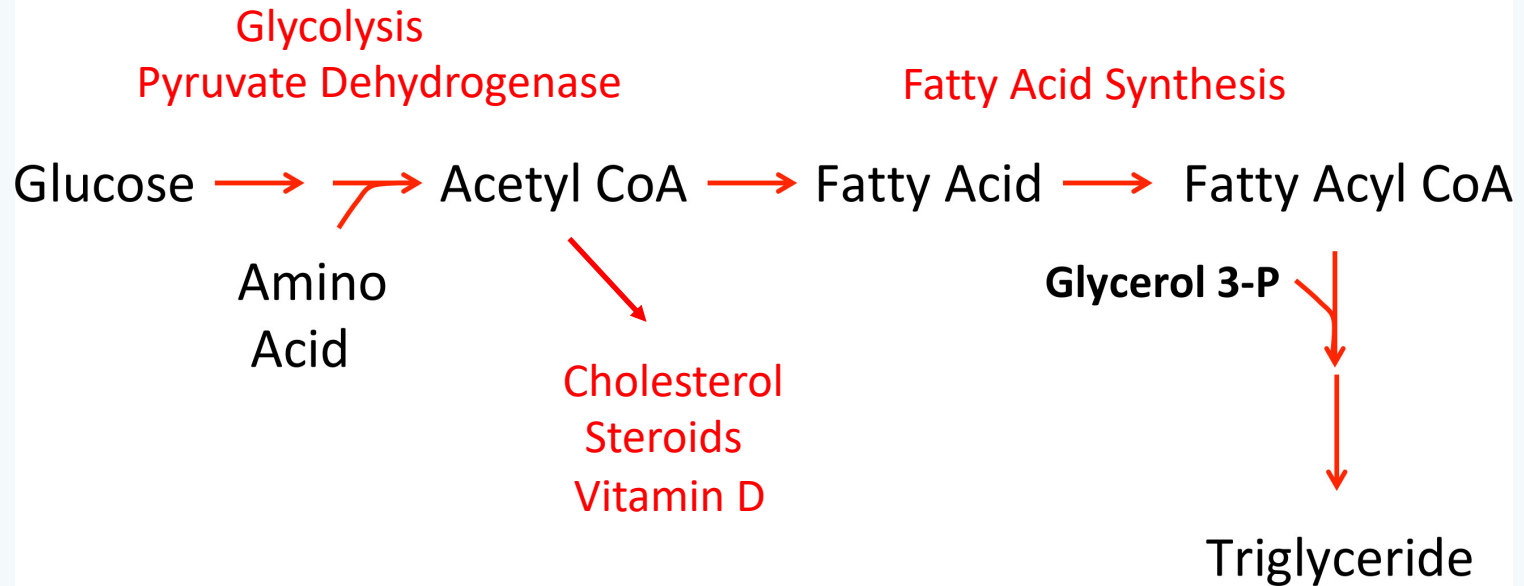
Triglyceride Synthesis



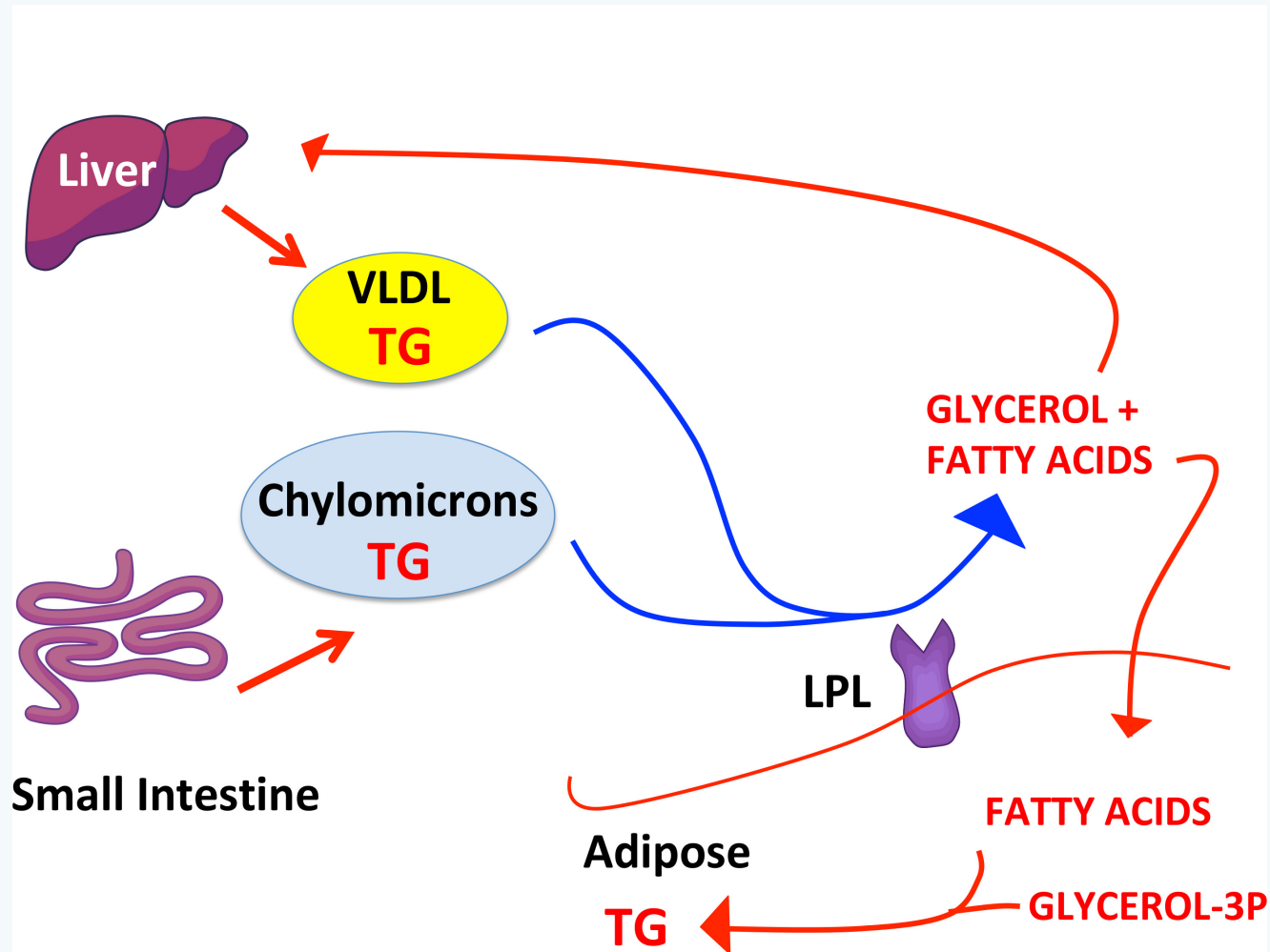
Coordination of Pathways in the Fed State



Coordination of Pathways in the Fed State

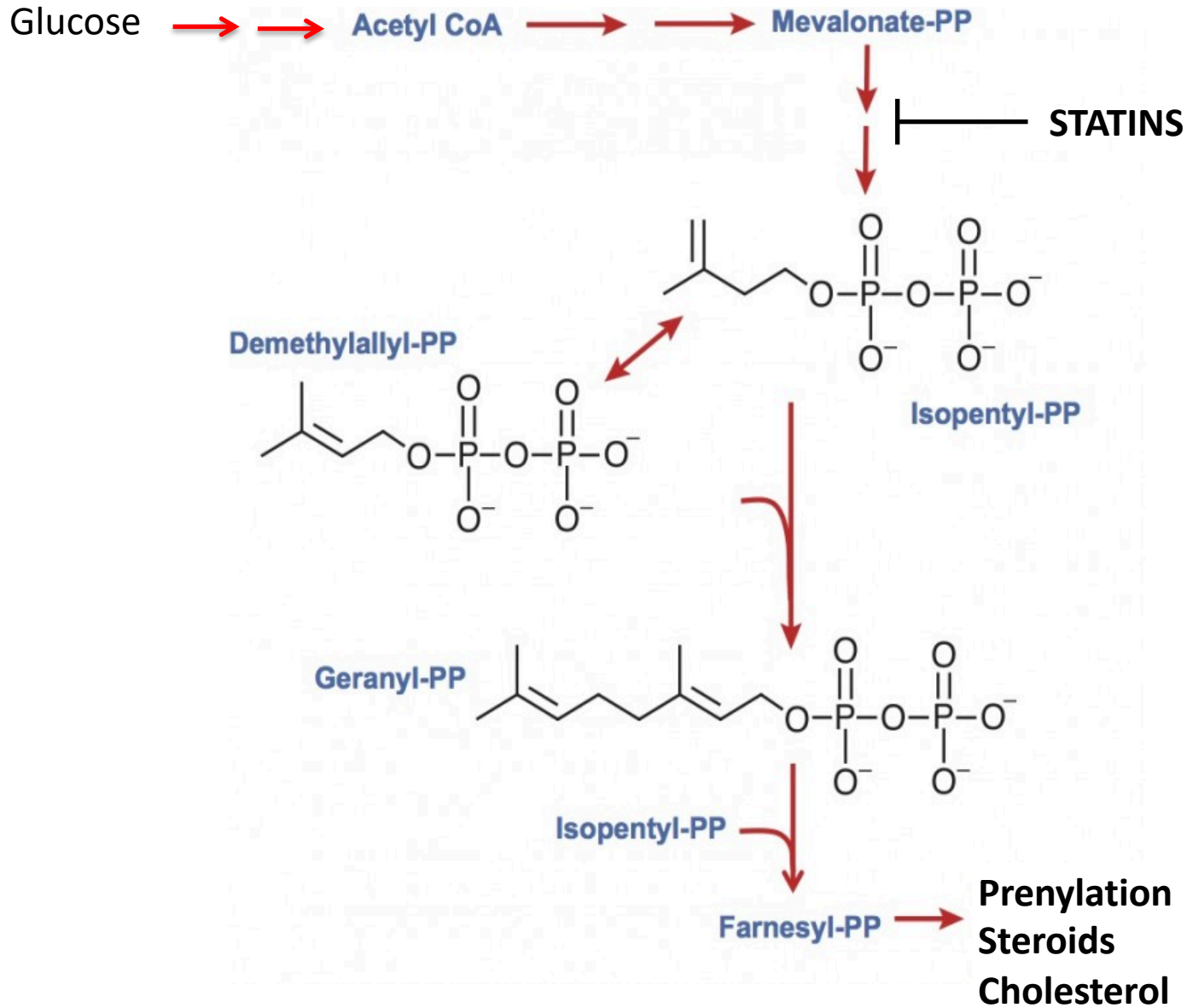


Triglyceride (TG) Transport



LPL = Lipoprotein Lipase

Mevalonate Pathway



Mevalonate Pathway

Content Category 3A: Structure and functions of the nervous and endocrine systems and ways in which these systems coordinate the organ systems

Lipids

- ☐ Structures
- ☐ Steroids
- ☒ Terpenes and terpenoids

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Fed State: Insulin & Fatty Acid Synthesis



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