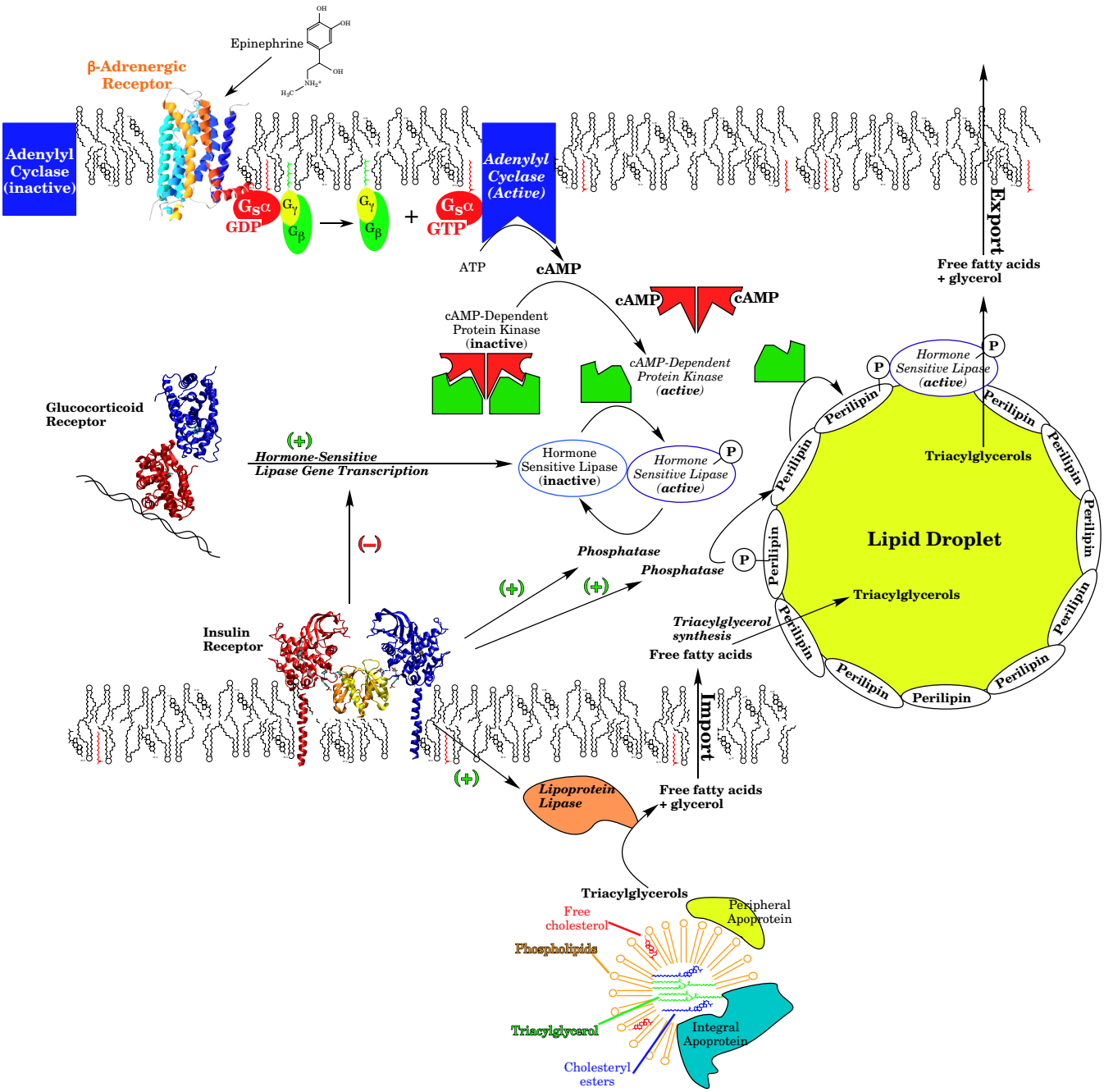
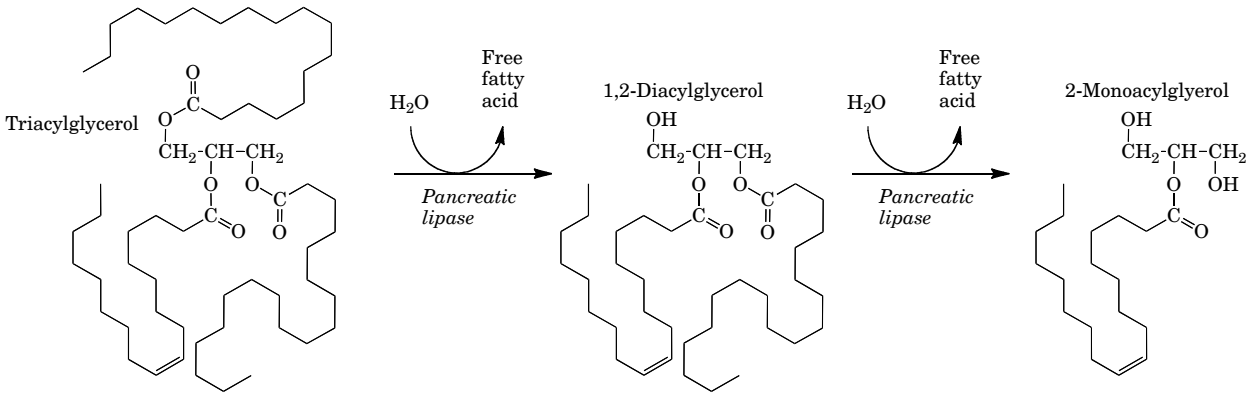
Overview of Adipose Tissue Processes

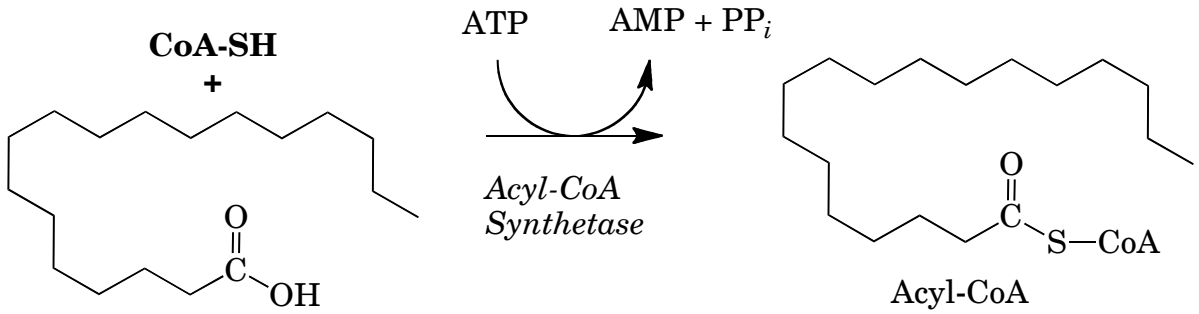


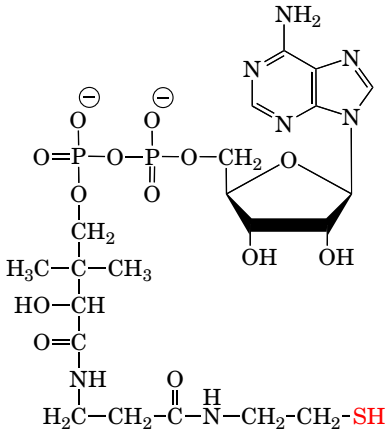
Lipase Action



Fatty Acid Transport Protein (FATP)

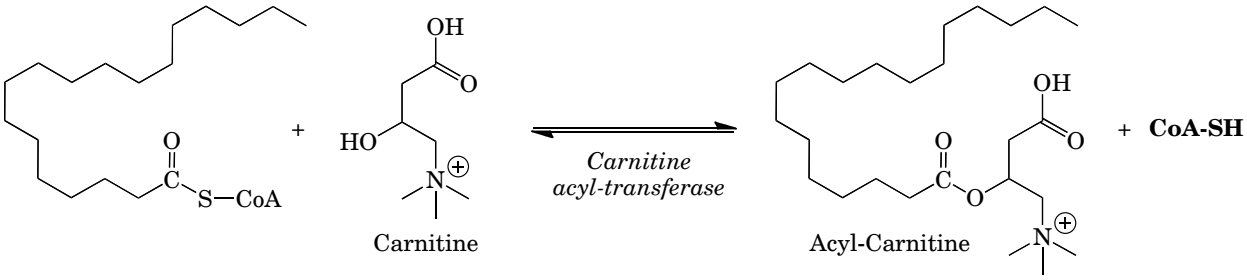
Activation

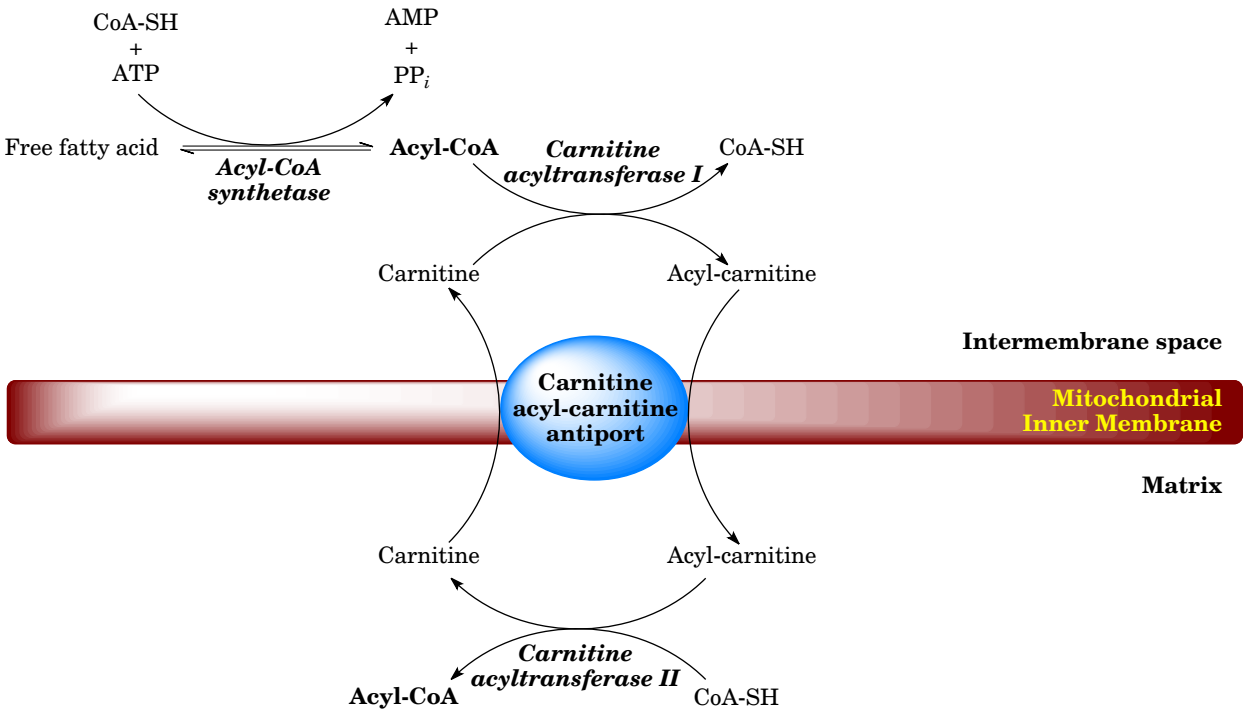




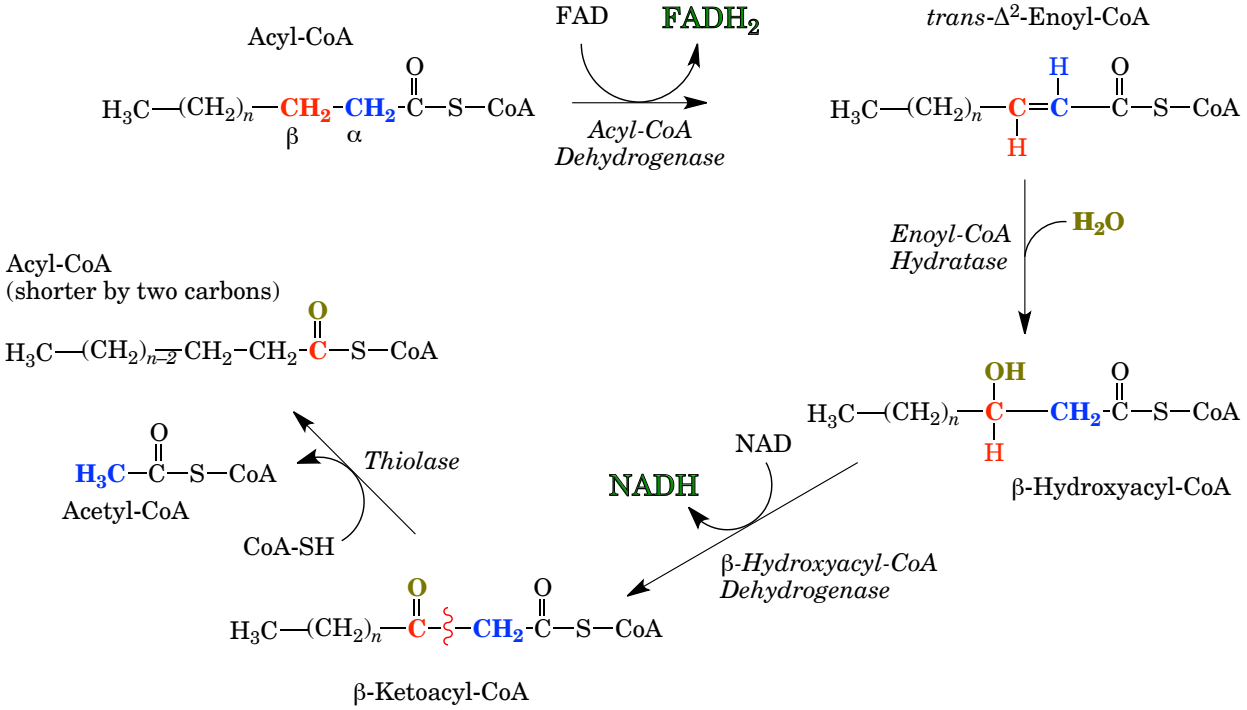
Coenzyme A (CoA-SH)

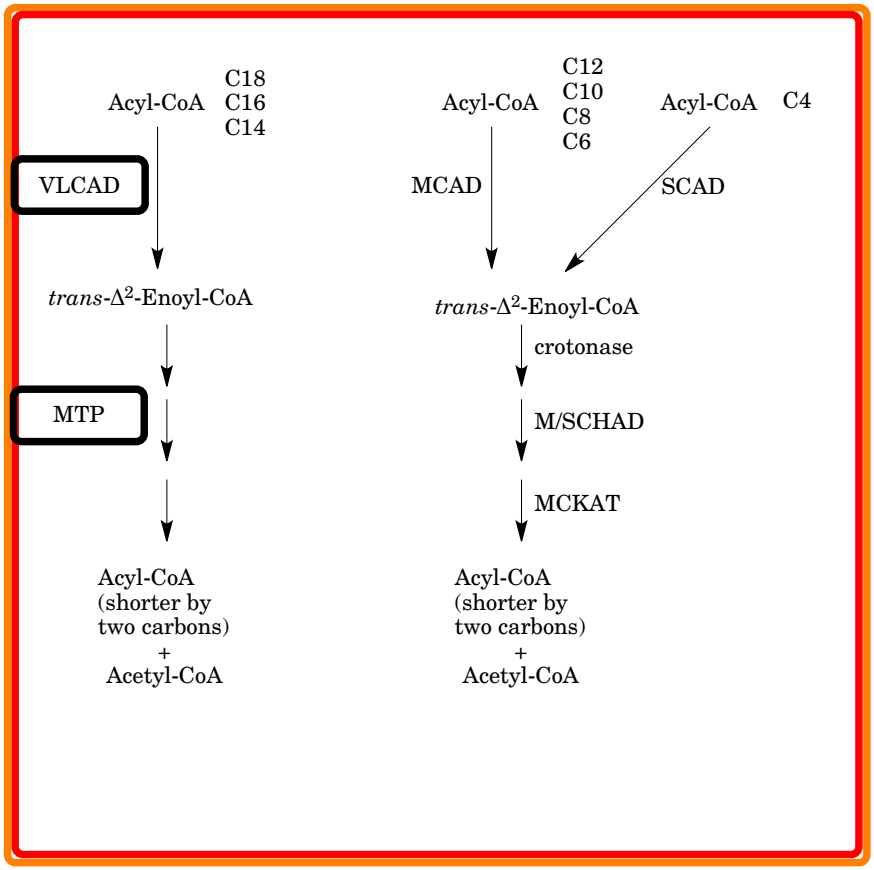
Mitochondrial Import



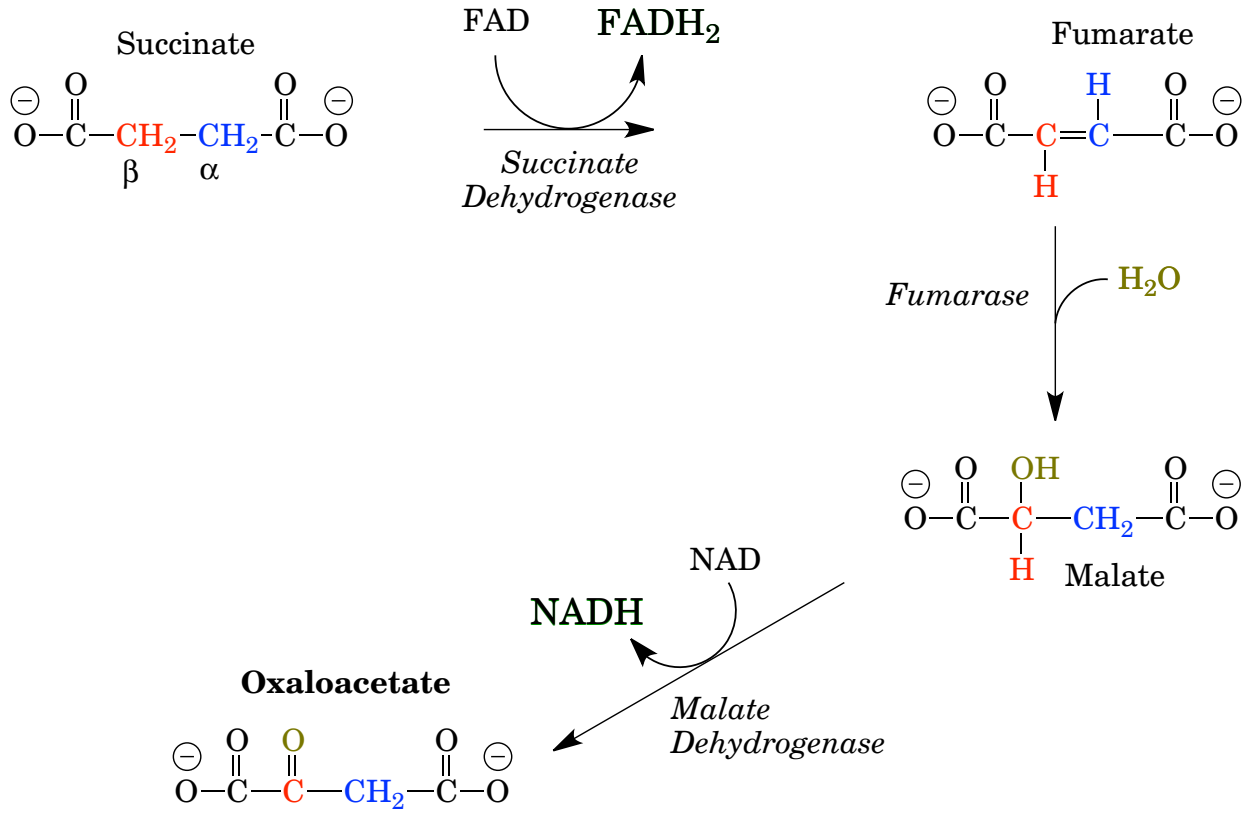


Fatty Acid β-Oxidation

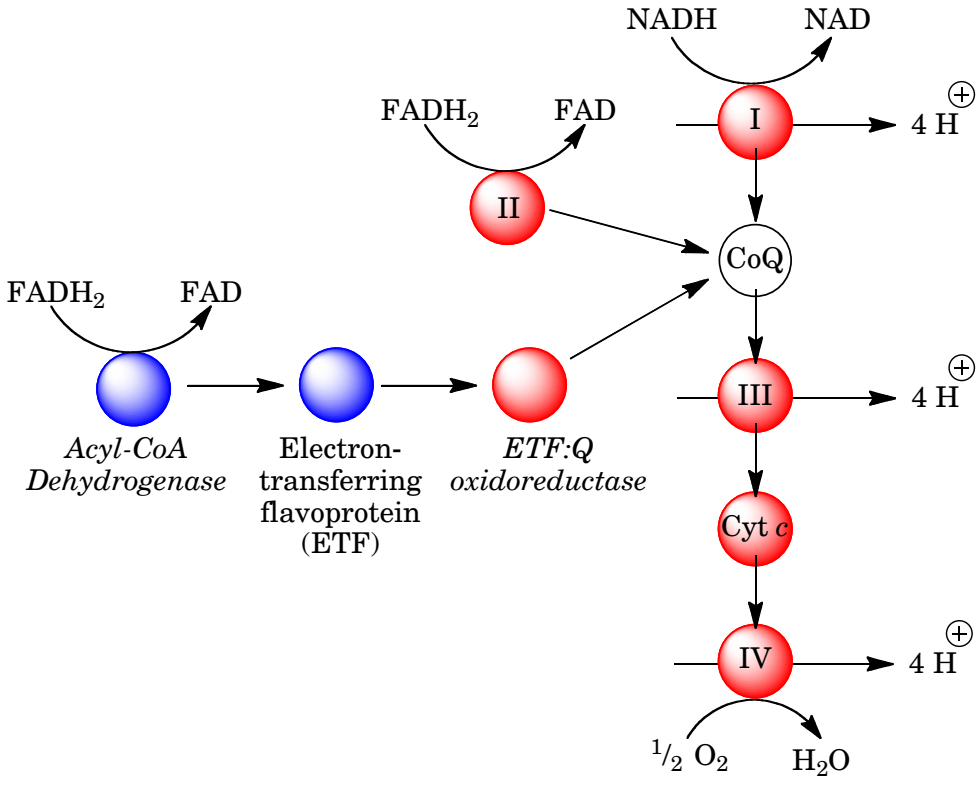




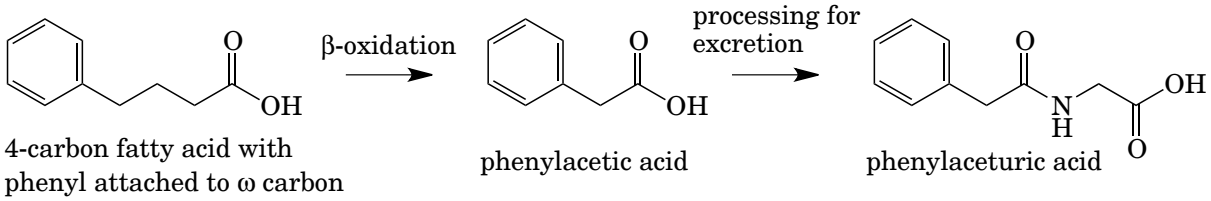
Paralogous Reactions



Electron Transport



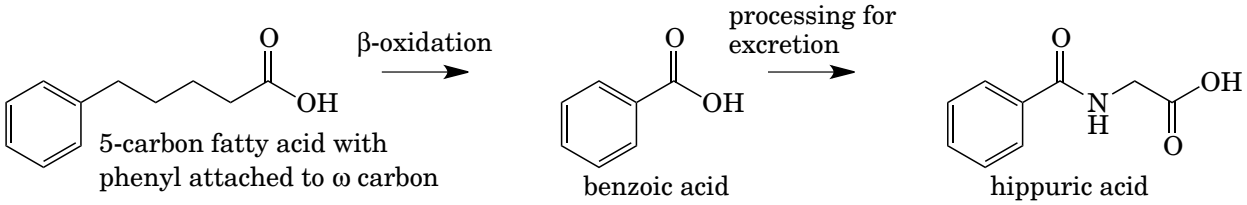
Pathway Elucidation



4-carbon fatty acid with phenyl attached to ω carbon

phenylacetic acid

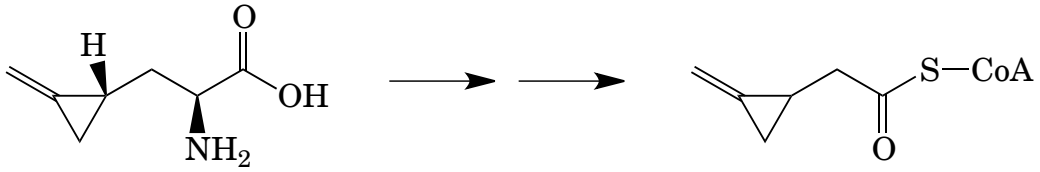
phenylaceturic acid



5-carbon fatty acid with phenyl attached to ω carbon

benzoic acid

hippuric acid

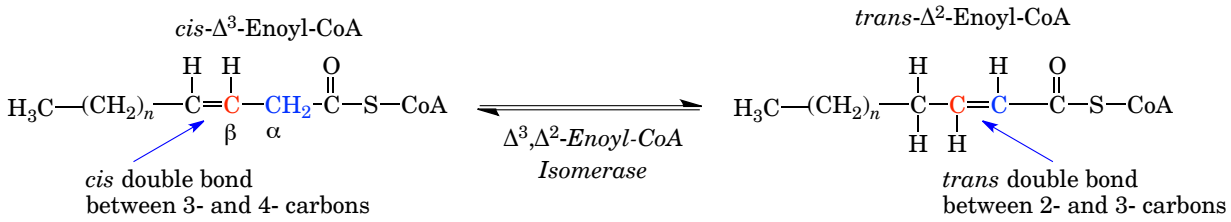


Hypoglycin

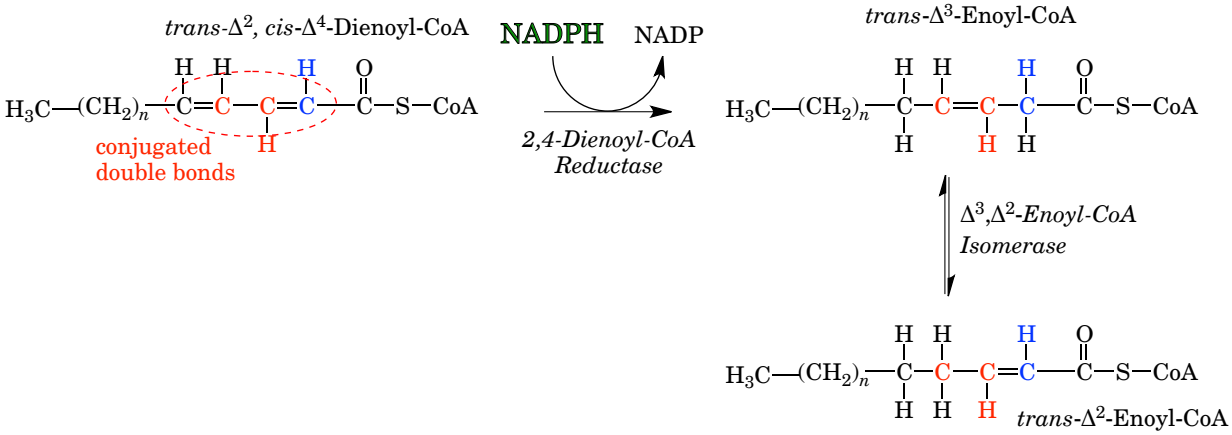
Methylenecyclopropyl acetyl CoA (MCPA-CoA)

Variations on the β-oxidation theme

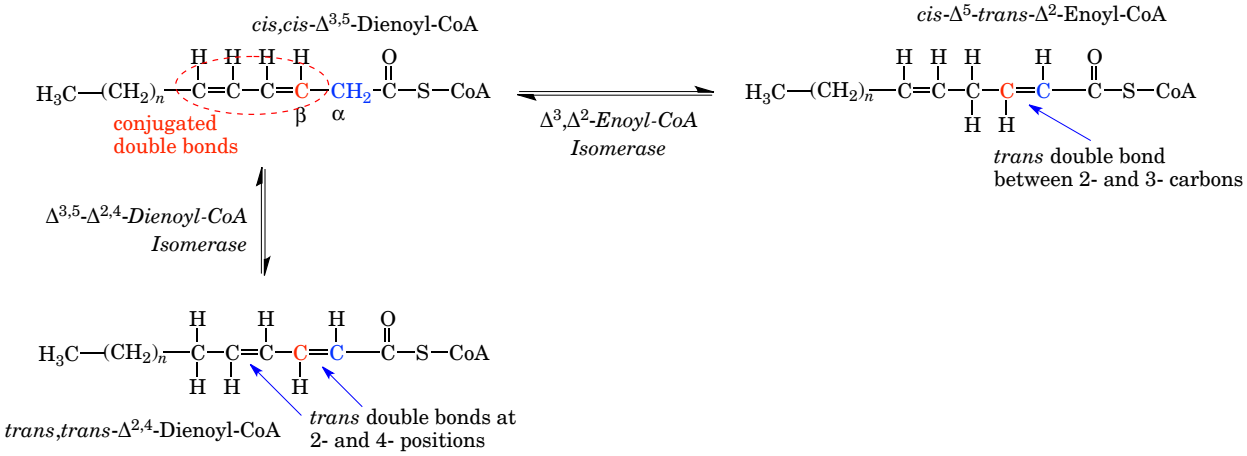
For fatty acids with odd numbered double bonds



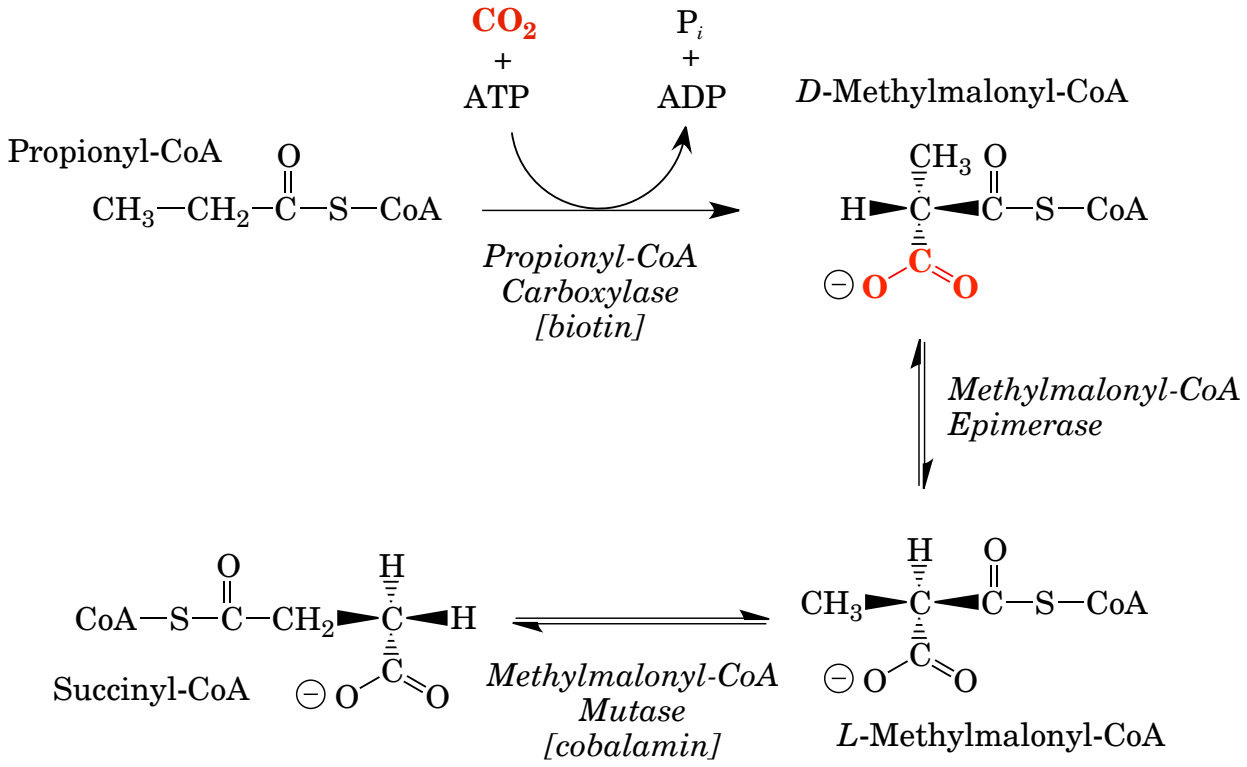
For fatty acids with even numbered double bonds

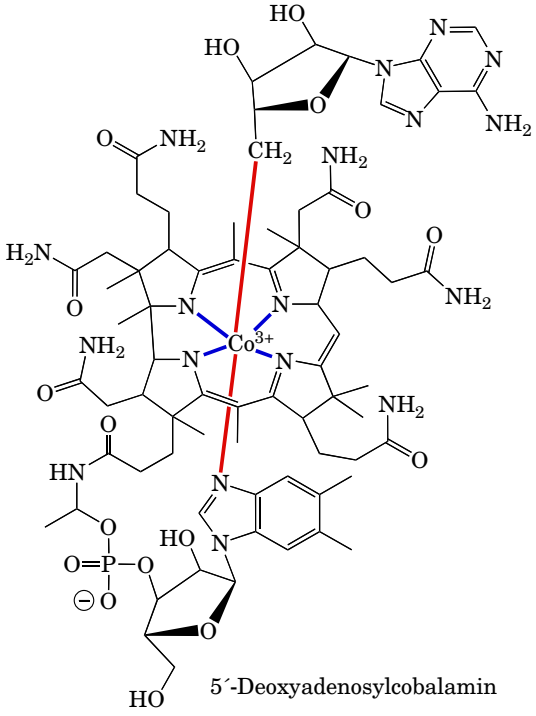


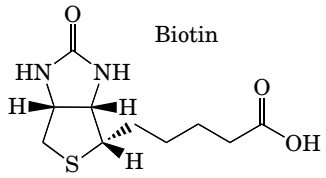
For fatty acids with odd numbered double bonds

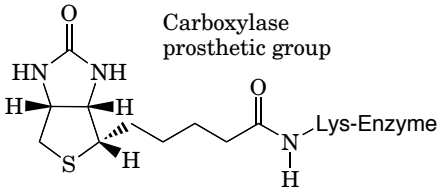


Propionyl-CoA

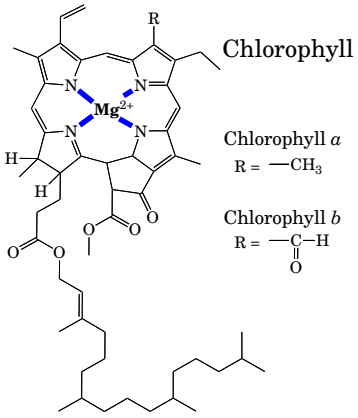


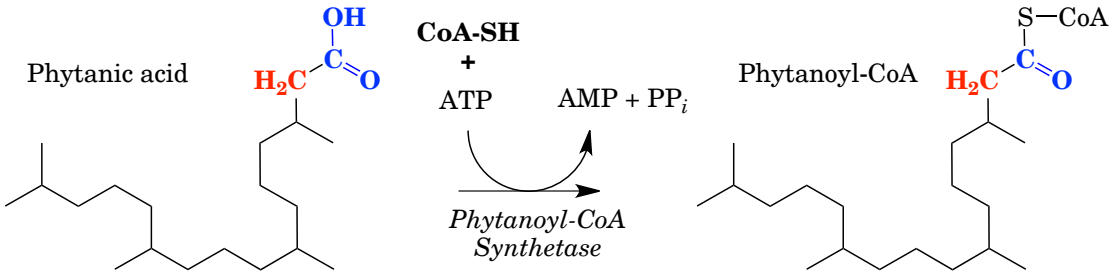


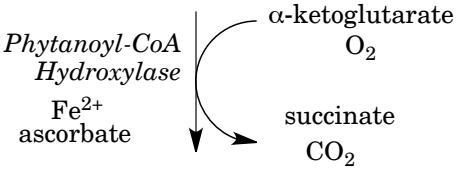


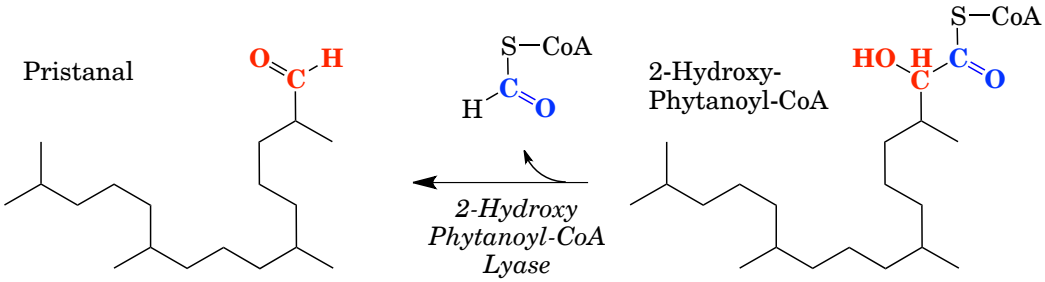


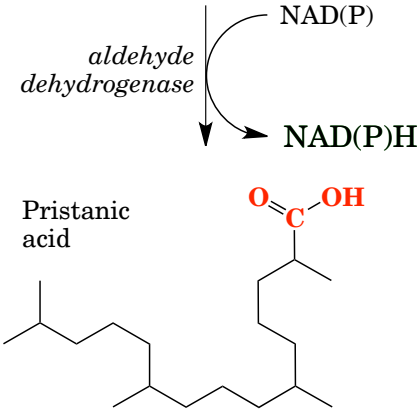
α-Oxidation


Chlorophyll
Chlorophyll *a*
R = —CH3
Chlorophyll *b*
R = —C(=O)—H

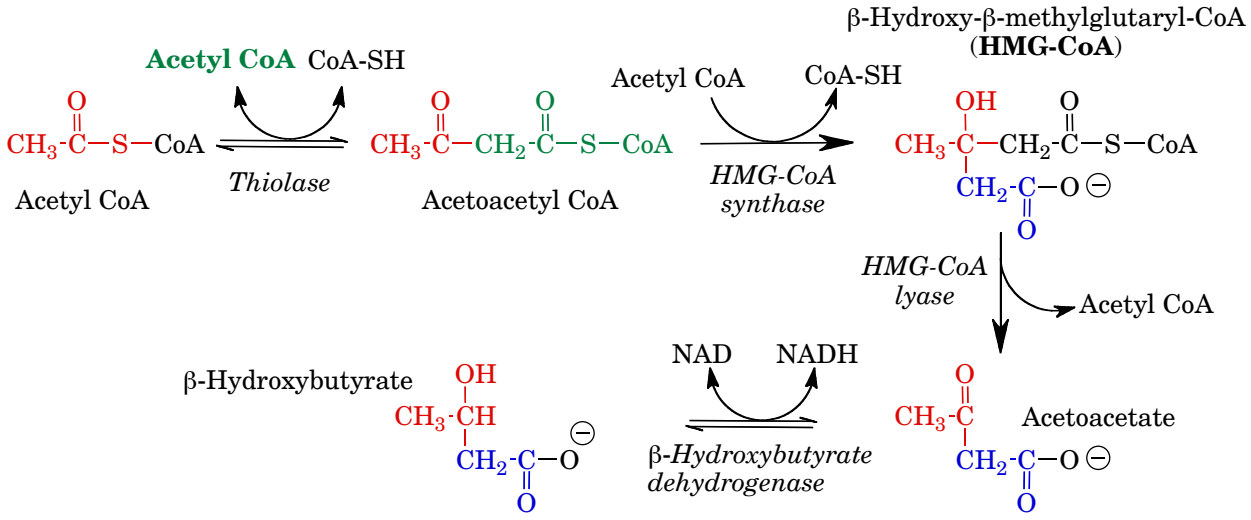

Phytanic acid
CoA-SH
+
ATP
AMP + PPi
Phytanoyl-CoA Synthetase
Phytanoyl-CoA


Phytanoyl-CoA Hydroxylase
Fe2+
ascorbate
α-ketoglutarate
O2
succinate
CO2

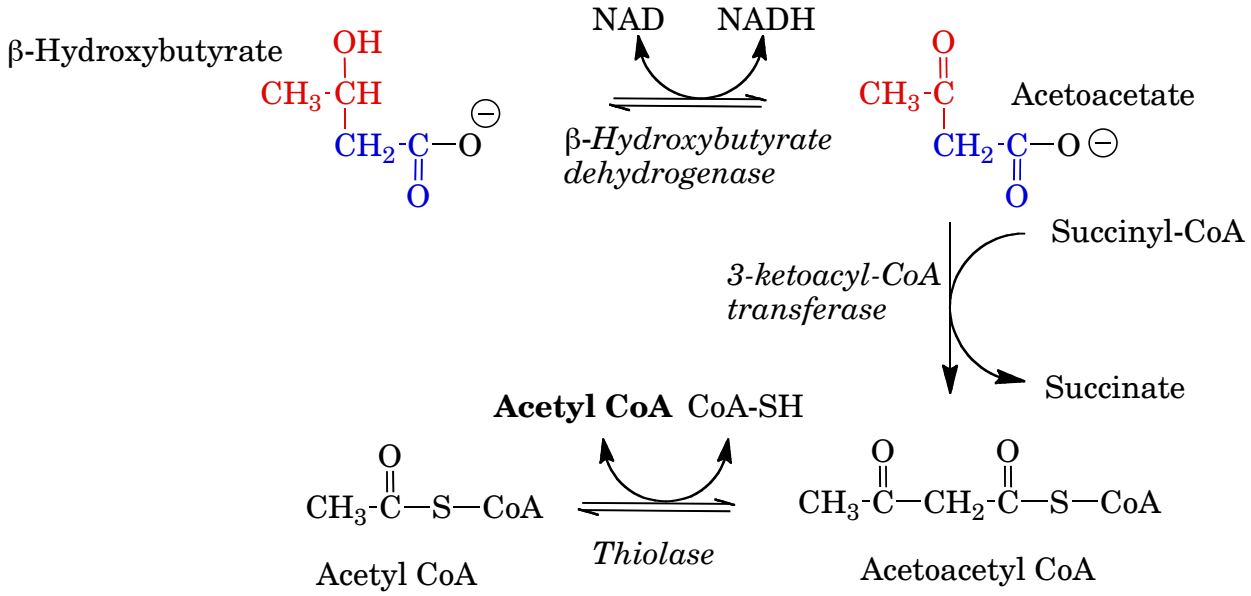

Pristanal
2-Hydroxy-
Phytanoyl-CoA
2-Hydroxy Phytanoyl-CoA Lyase


aldehyde dehydrogenase
NAD(P)
NAD(P)H
Pristanic acid

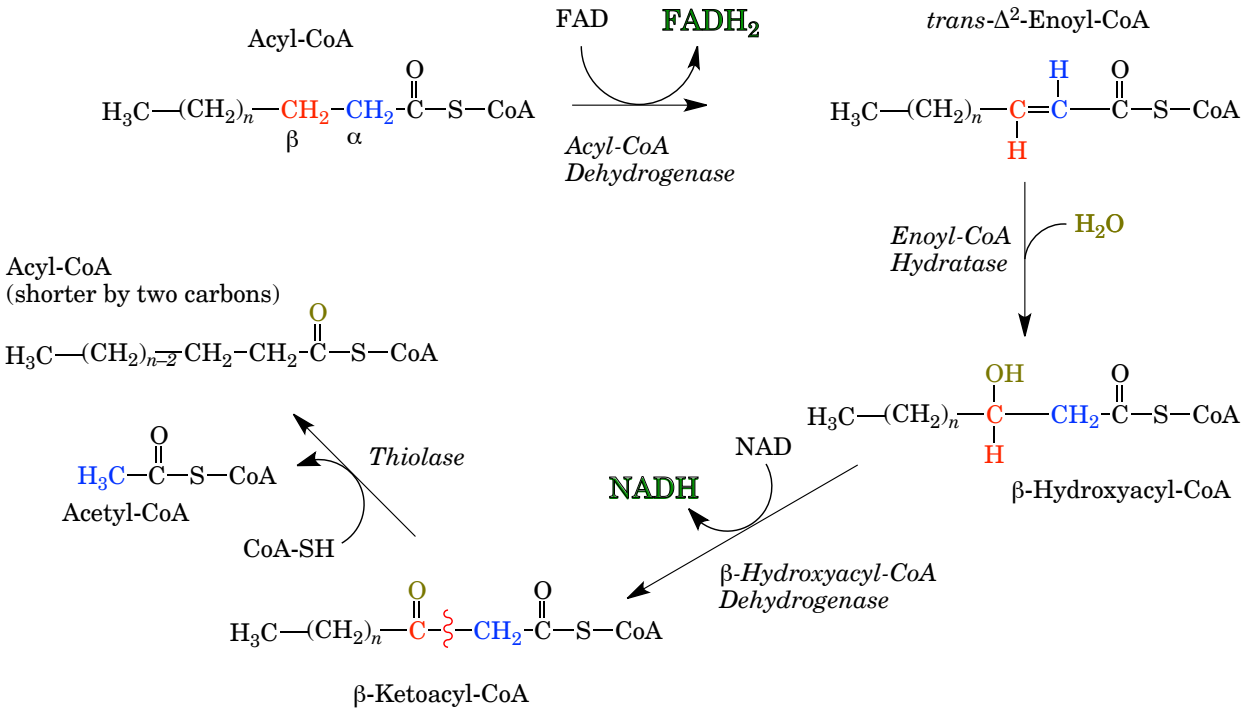
Ketone Body Synthesis



Ketone Body Utilization



Fatty Acid β-oxidation



Comparison of Energetics of Metabolism for Glucose and Stearic Acid

Energetic molecule	Glucose	Stearate ↓ Acetyl-CoA	9 Acetyl-CoA ↓ CO_2	Stearate (total)
Products				
ATP	**4 → 4 ATP**	–2	9	**7 → 7 ATP**
NADH	**10 → 30 ATP**	8	27	**35 → 105 ATP**
$FADH_2$	**2 → 4 ATP**	8	9	**17 → 34 ATP**
Total	**38 ATP**			**146 ATP**

Compound	ATP per carbon	Molecular Weight (g/mol)	ATP per gram (dry weight)	ATP per gram (wet weight)
Glucose (6 carbons)	6.3	180	0.2	~0.06
Stearate (18 carbons)	8.1	284	0.5	~0.5