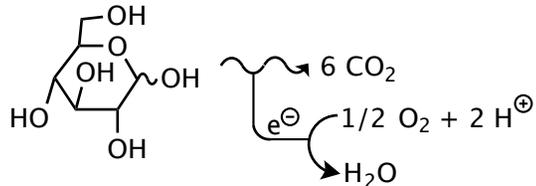


-- So far in 5.07 - carbohydrate metabolism

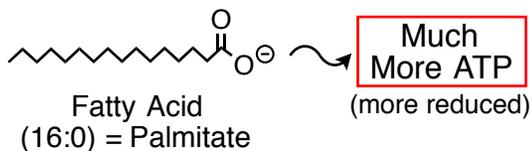
-- Get 36-38 ATPs



Session 16 - Lipid Catabolism

-- Lipids = Small hydrocarbons (often amphiphilic)

-- Lipids: Sometimes made of Fatty Acids (FA)

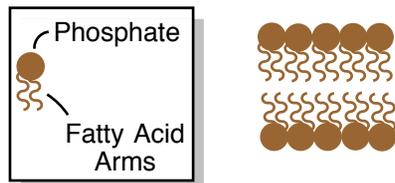


A

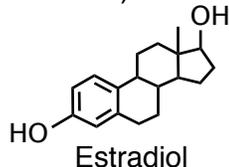
Roles of Lipids

1.) Energy storage (FAs) - our primary reserve

2.) Biological Membranes



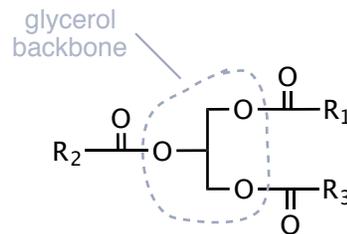
3.) Signaling (e.g., steroid hormones)



B

Fats

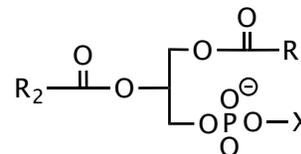
Complex Lipid e.g., Triacylglyceride



See slides on how we acquire lipids from diet or how we manufacture them (e.g., in the liver). We store them in adipose tissue.

Fat is stored this way (for later use in energy generation)

or a Phospholipid (Membrane Lipid)



X = H ≡ Phosphatidic Acid

X = sugar ≡ Glycolipid

Stages of FA Catabolism

1.) FA → FAcyl CoA (cytoplasm)

2.) FAcyl CoA → Mitochondrion (site of β-oxidation)

3.) β-oxidation → to Acetyl CoA

4.) Special Endings of FA Catabolism

a.) Odd chain numbered FAs

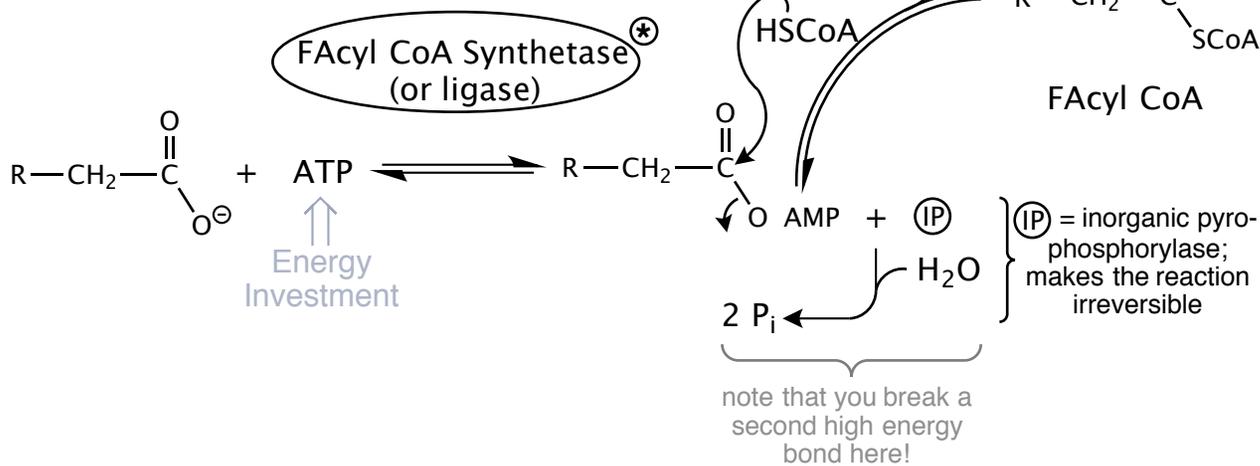
b.) Unsaturated FA (getting double bond in the right place for oxidation) - tricky because most unsaturated FA have cis-double bonds

D

Stages (continued)

1.) Formation of FAcyl CoAs

- * Need to make thio-ester for FA to be oxidizable (same principle as AcS CoA)
- * Synthetases involve a nucleotide

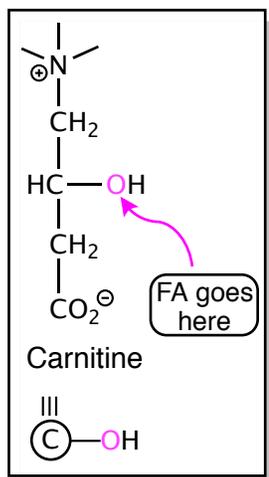
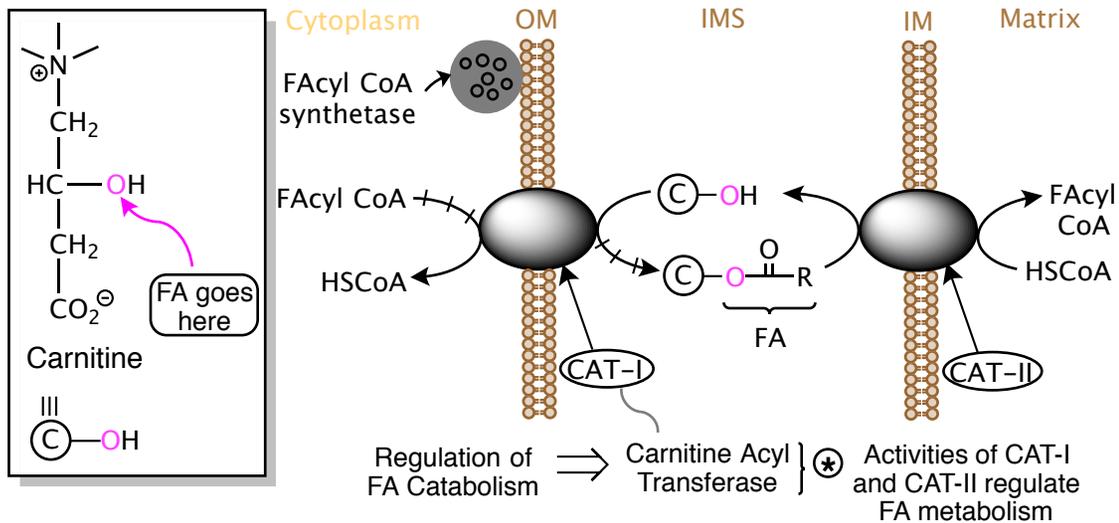


E

- Thioester - pKa favorable for chemistry!

2. Entry of FAcy CoA into Mitochondrion

-- mitochondrion is the site of β -oxidation

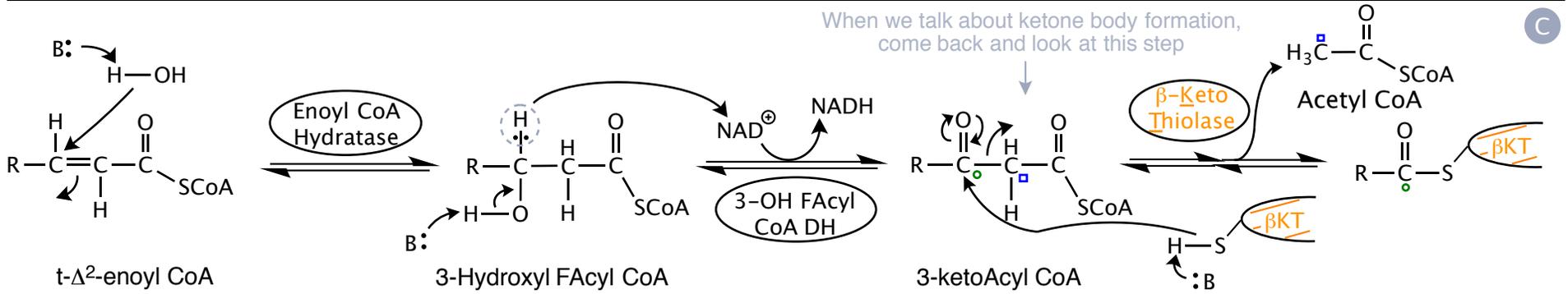
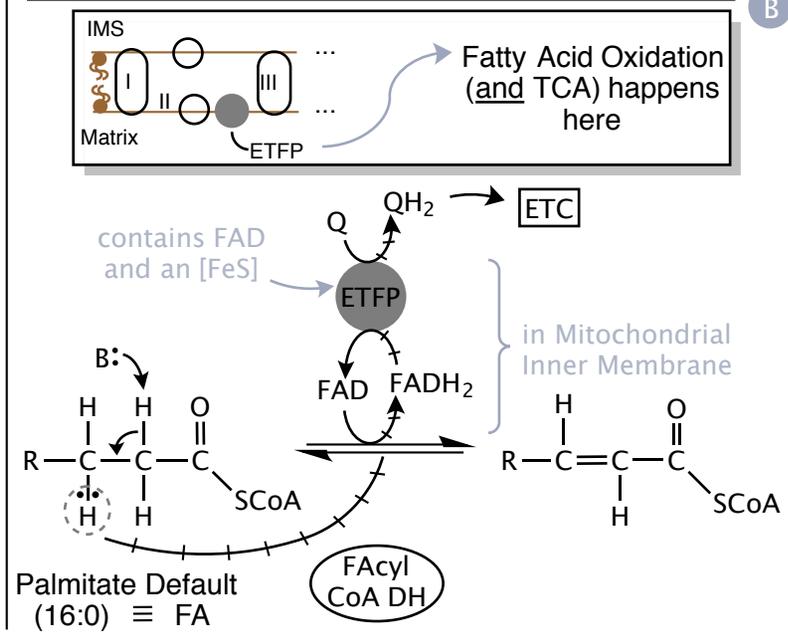


A

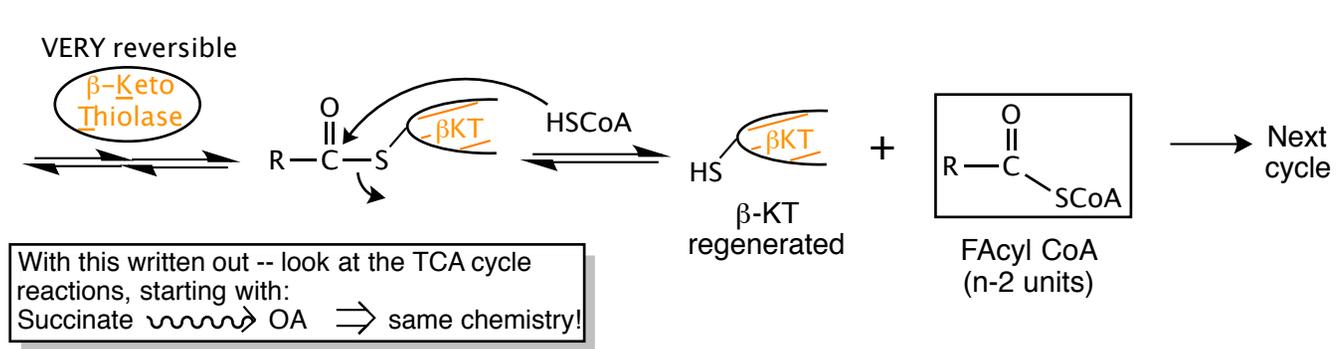
3. β -Oxidation (Mitochondrial Matrix Reactions)

18

B



C



With this written out -- look at the TCA cycle reactions, starting with: Succinate \rightsquigarrow OA \Rightarrow same chemistry!

<chem>CCCCCCCCCCCCCCCC(=O)SCoA</chem>	
7 rounds	
8 AcCoA	(12 x 8 = 96 ATP)
7 FADH ₂	(14 ATP)
7 NADH	(21 ATP)
131 ATP (minus the 2 ATP at FADCoA Synthase)	

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5.07SC Biological Chemistry I
Fall 2013

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