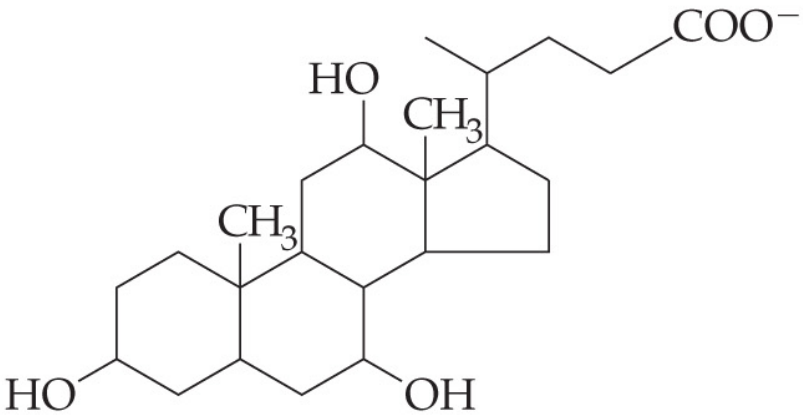
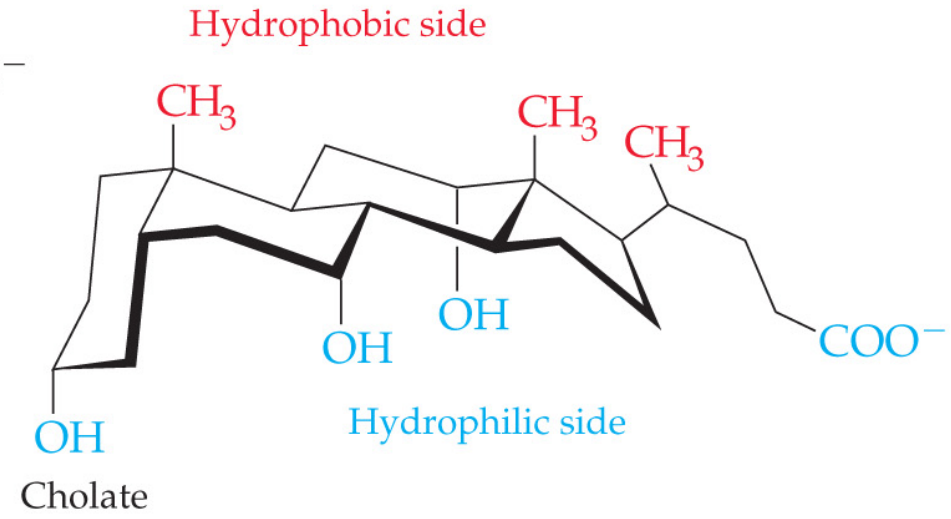
Chem 30B

Ch24: Lipid Metabolism

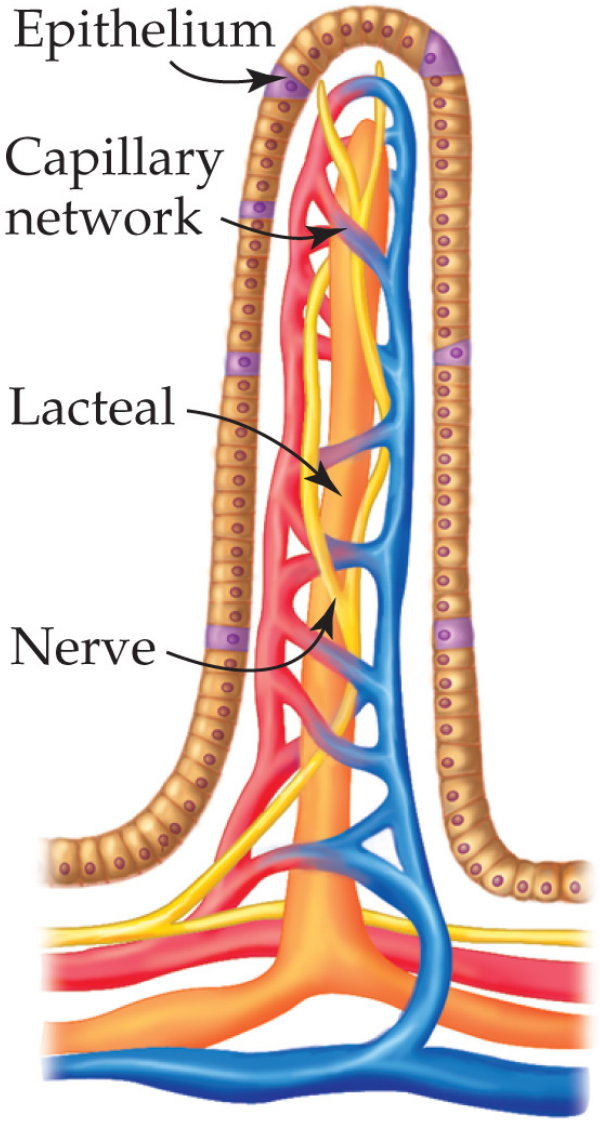
Bile Acid



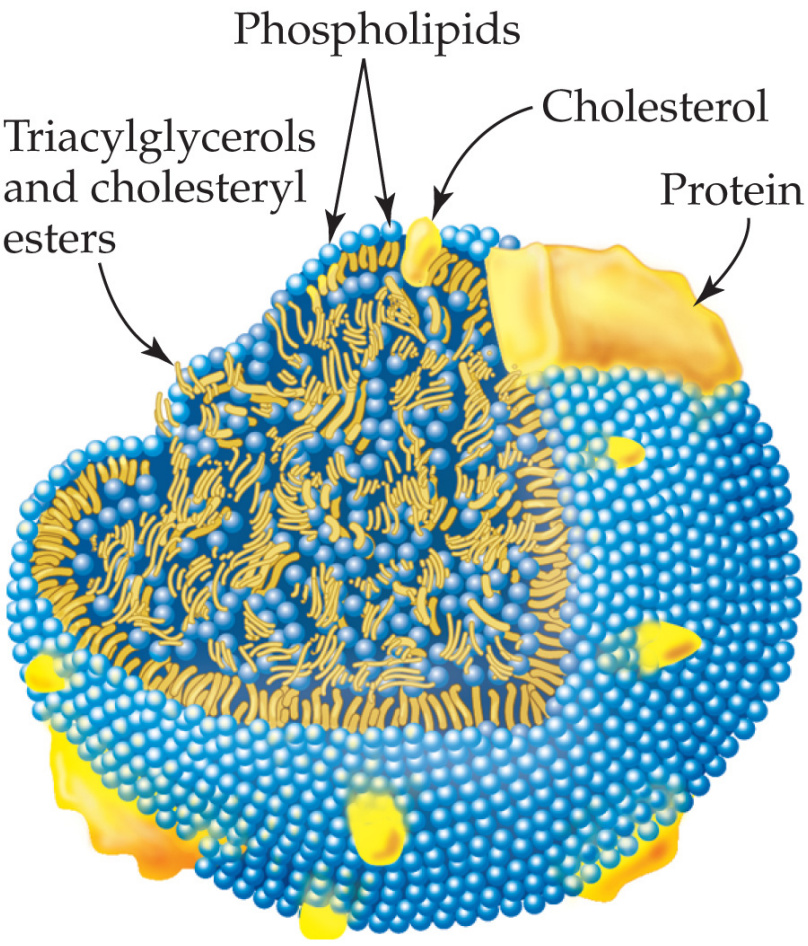


Cholate

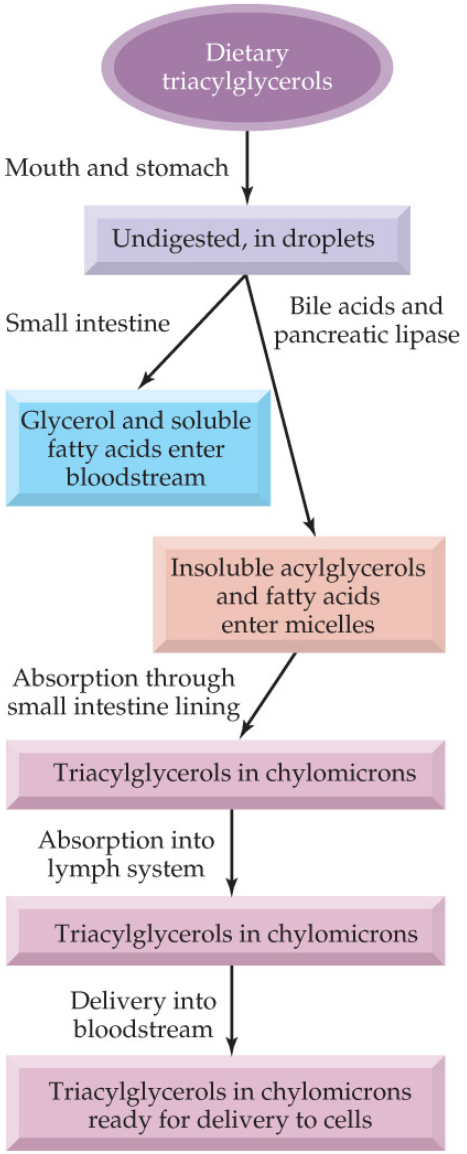
A Villus in Lining of Small Intestine



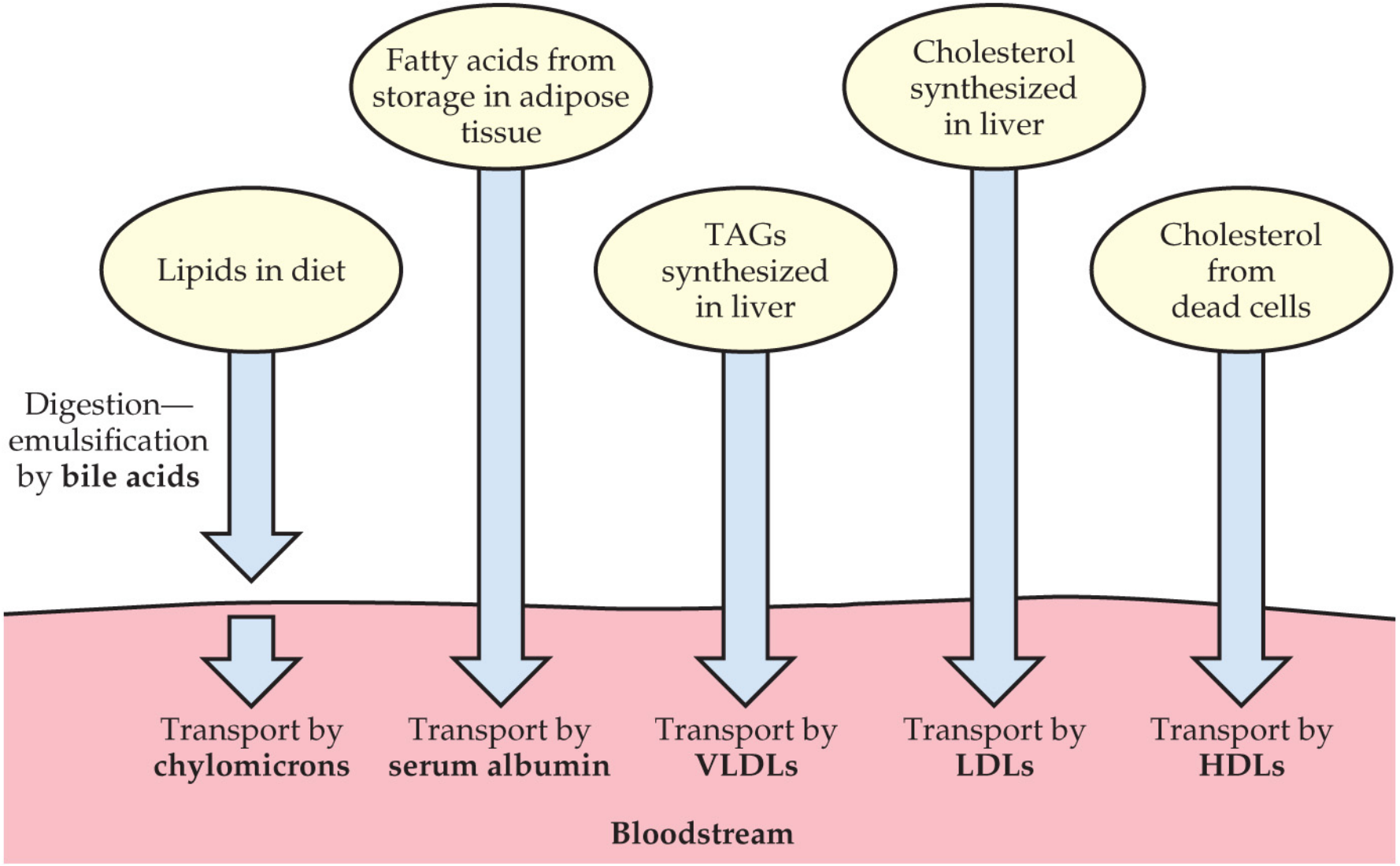
Chylomicron



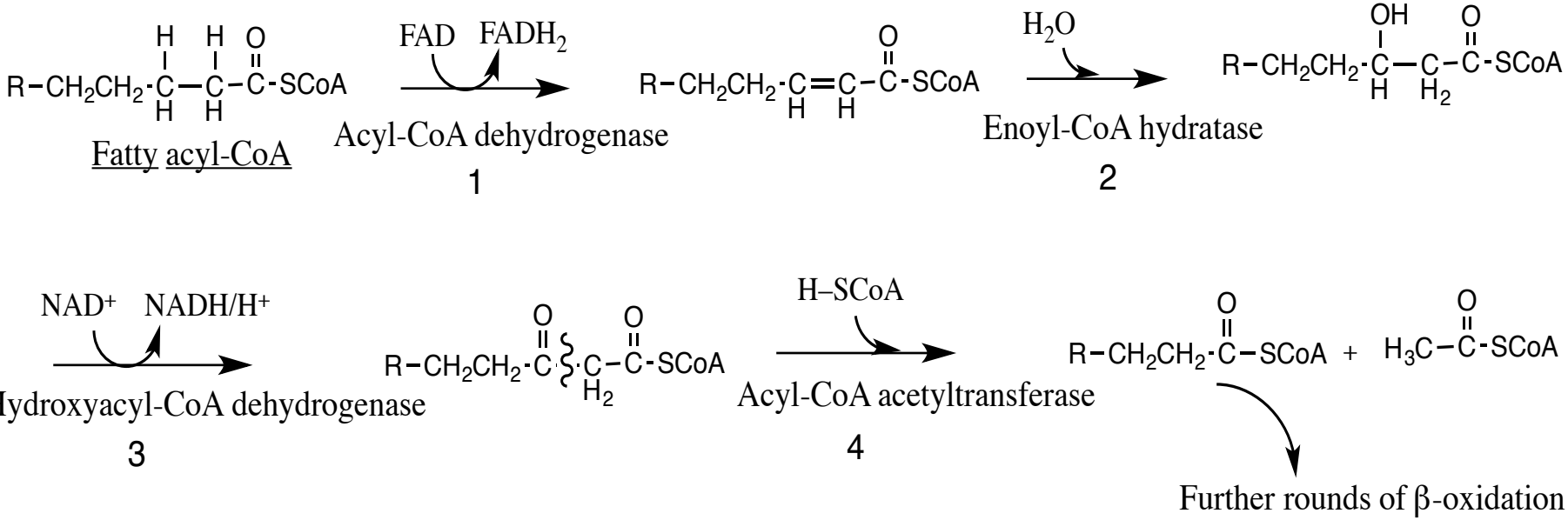
Digestion of Triacylglycerols



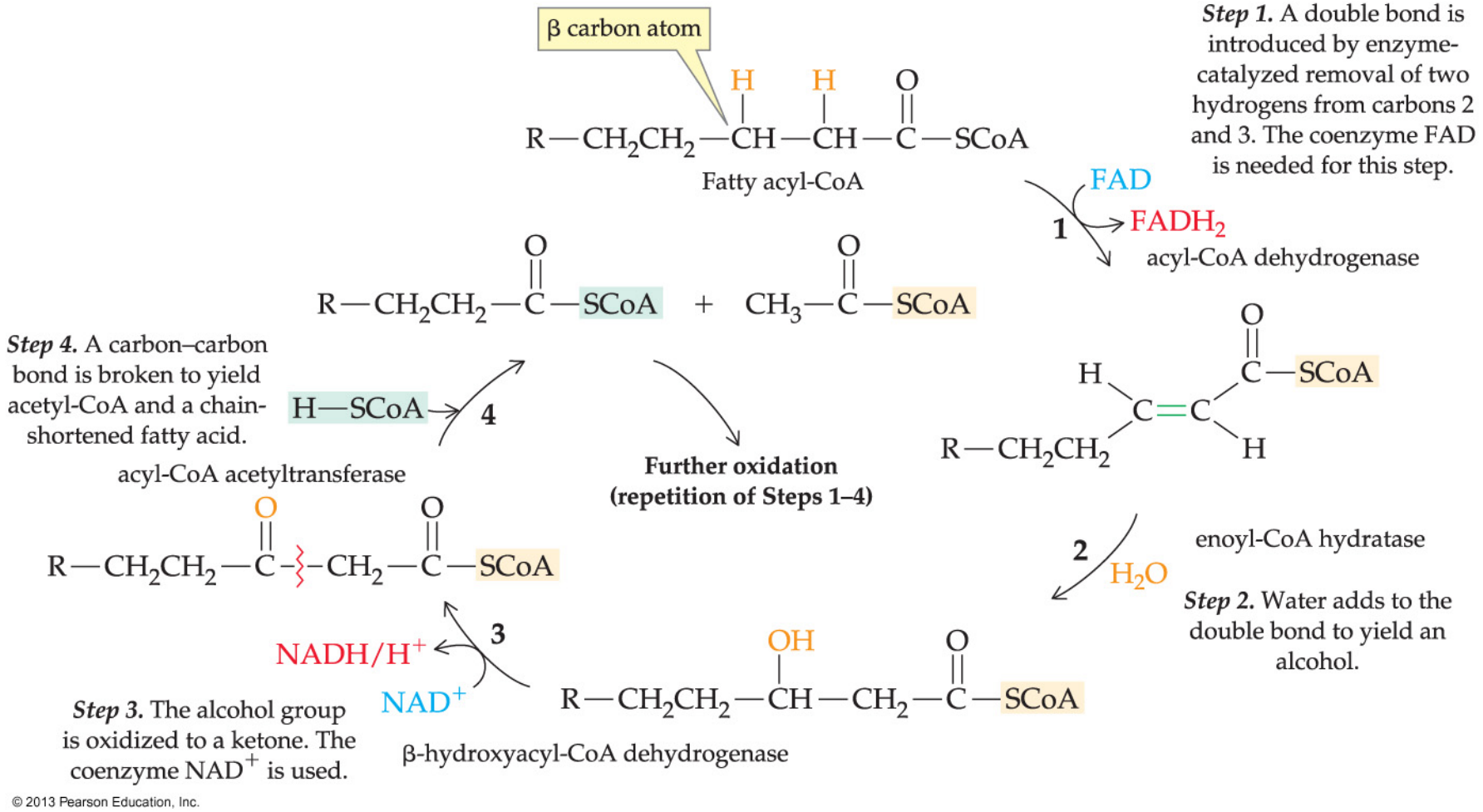
Lipoproteins



[Handout] Oxidation of Fatty Acid



Oxidation of Fatty Acids



Energy from Fatty Acid Oxidation

1. **Activation**: –2 ATP [One-time loss for the whole fatty acid molecule]

2. β-Oxidation:

2 ATP (from 1 $FADH_2$) + 3 ATP (from 1 NADH) = 5 ATP/ β-oxidation round

*(*5 ATP/ β-oxidation round) x No. of β-oxidation rounds = No. of ATP from all β-oxidation rounds

*Note: Repeat β-oxidation for each 2-carbon unit EXCEPT for the last 2-carbon unit, since last oxidation cleaves 4-C unit into 2 acetyl-CoA.

3. Citric acid cycle:

No. of carbon atoms in fatty acid/2 = No. of acetyl-CoA

(12 ATP / 1 acetyl-CoA) x No. of acetyl-CoA = No. of ATP from all acetyl-CoA

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TOTAL: Net ATP from three steps above.

Energy Yield from Glucose vs. Fatty Acid

- 1 mol of glucose (180 g) generates 38 mol of ATP.
- 1 mol of lauric acid (12:0, 200 g) generates 95 mol of ATP.
- Fatty acids yields more energy per gram than carbohydrates:

Carbohydrates = 4 Cal/g (16.7 kJ/g)

Fats and oils = 9 Cal/g (37.7 kJ/g)