

Selected homework question answers from chapter 25

21.15 – When ATP “drives” a reaction; energy from ATP is used to enable another reaction to proceed. In this case, the reaction that forms fatty acid-SCoA from a fatty acid and coenzyme A is endergonic and is unfavorable in the absence of ATP. When a phosphoryl group from ATP is used to drive the reaction, the formation of fatty acid-SCoA can take place. Coupling is the metabolic strategy in which the energy from an energetically favorable reaction can be used to allow an energetically unfavorable reaction to take place.

25.9 – In fatty acid oxidation, as in glucose catabolism, there is an initial energy investment. Conversion of a fatty acid to a fatty acid-SCoA is coupled with the conversion of ATP to AMP and pyrophosphate, which is subsequently hydrolyzed to two hydrogen phosphate ions. This energy investment is equivalent to the two ATPs spent in the early stages of glucose catabolism.

25.34 – The number of moles of acetyl-SCoA produced from one mole of fatty acid is half the number of carbons in the acid. The number of cycles of  $\beta$  oxidation is one less than the number of moles of acetyl-SCoA produced.

<i>Acid</i>	<i>Acetyl-SCoA Produced</i>	<i>Number of cycles</i>
$\text{CH}_3(\text{CH}_2)_6\text{COOH}$	4	3
$\text{CH}_3(\text{CH}_2)_{12}\text{COOH}$	7	6

25.52 – An excess of carbohydrates produces an excess of acetyl-SCoA. If more acetyl-SCoA is produced than is needed in the respiratory chain, it is used to synthesize fatty acids, which are used to produce the triglycerides that are deposited in adipose tissue. Once carbohydrates have been catabolized to acetyl-SCoA, it is not possible to resynthesize carbohydrates, because animals don't have enzymes to synthesize carbohydrates from acetyl-SCoA.