Week 4 – Energy Conversion Pathways

Part I – Cellular respiration (con't)

Learning Goal: Understand how the process of cellular respiration allows energy stored in molecules (food) to be transformed into another form, primarily chemical energy stored in ATP.

After the pre-class assignments you should be able to:

- Discuss what happens to matter and energy through the different stages of cellular respiration: glycolysis, pyruvate oxidation, the citric acid cycle, and ETC/oxidative phosphorylation
- Identify where the different stages of cellular respiration occur in the eukaryotic cell
- Describe the structure and function of ATP synthase
- Compare and contrast the generation of ATP in the presence or absence of oxygen
- Relate the metabolism of different molecules (i.e., sugars and fats) to the process of cellular respiration
- Explain how the process of cellular respiration can be regulated by inhibiting or activating PFK

By the time you take the second midterm you should also be able to:

- Connect redox reactions to the energy transformations that occur throughout cellular respiration
- Relate the movement of electrons through the electron transport chain to the production of ATP by ATP synthase
- Predict how introducing changes in one stage of cellular respiration (e.g., altering the activity of an enzyme) will affect components both upstream and downstream of the change
- Evaluate how changes in one metabolic pathway (i.e., fatty acid synthesis) will affect the products, reactants, and reaction rates of other integrated metabolic pathways

Part II – Photosynthesis

Learning Goal: Understand how photosynthetic organisms with chloroplasts transform light energy into chemical energy.

After the pre-class assignments you should be able to:

- Connect redox reactions to energy transformations that occur throughout photosynthesis
- Identify where the different stages of photosynthesis take place
- Explain how the Calvin Cycle transforms carbon dioxide into sugar and where the energy for this transformation comes from
- Describe the role of Rubisco in the process of photosynthesis
- Explain how light energy reaches photosystem reaction centers and what happens when it gets there

By the time you take the second midterm you should also be able to:

- Predict how introducing changes in one stage of photosynthesis (e.g., altering the activity of an enzyme) will affect the production of NADPH, ATP, and sugar
- Discuss what a plant cell can do with the products of photosynthesis once they are produced
- Relate the process of photosynthesis to the process of cellular respiration