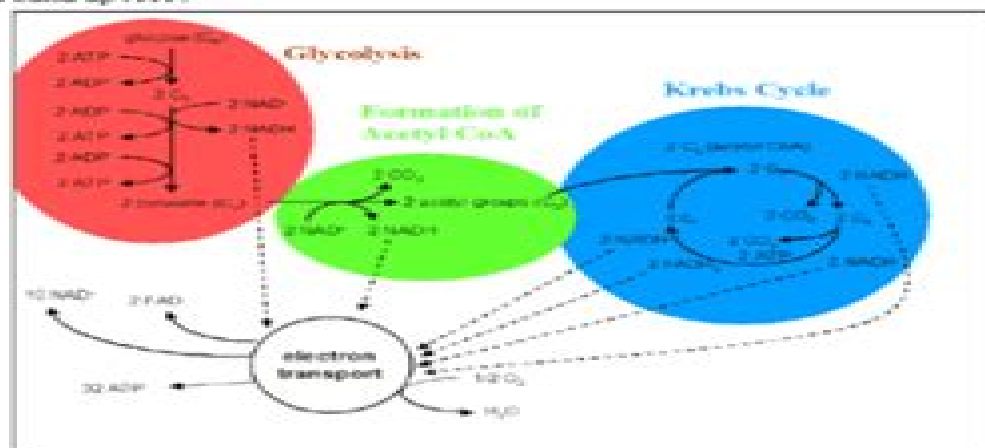
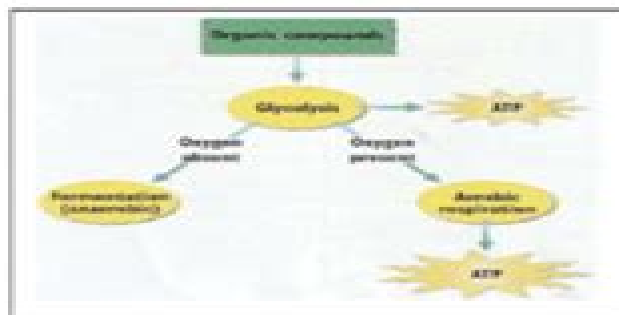


AP BIOLOGY – CHAPTER 7 Cellular Respiration Outline

I. How cells get energy.

A. Cellular Respiration

1. **Cellular respiration** includes the various metabolic pathways that break down carbohydrates and other metabolites and build up ATP.



2. Cellular respiration requires oxygen and gives off CO₂.
3. Aerobic respiration usually breaks down glucose into CO₂ and H₂O.
4. Overall equation for complete breakdown of glucose requires oxygen (is aerobic):

$$\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{energy}$$
5. Glucose is high-energy molecule; CO₂ and H₂O are low-energy molecules; process is exergonic and releases energy.
6. Electrons are removed from substrates and received by oxygen, combines with H⁺ to become water.
7. Glucose is oxidized and O₂ is reduced.
8. Buildup of ATP is an endergonic reaction that requires energy.
9. Pathways of aerobic respiration allow energy in glucose to be released slowly; ATP is produced gradually.
10. Rapid breakdown of glucose would lose most energy as non-usable heat.
11. Breakdown of glucose yields synthesis of 36 or 38 ATP; this preserves 39% of energy available in glucose.

B. NAD⁺ and FAD

1. Each metabolic reaction in cellular respiration is catalyzed by its own enzyme.
2. As a metabolite is oxidized, NAD⁺ accepts two electrons and a hydrogen ion (H⁺); results in NADH + H⁺.
3. Electrons received by NAD⁺ and FAD are high-energy electrons and are usually carried to the electron transport system.
4. NAD⁺ is a coenzyme of oxidation-reduction since it both accepts and gives up electrons.
5. Only a small amount of NAD⁺ is needed in cells; each NAD⁺ molecule is used over and over.
6. FAD coenzyme of oxidation-reduction can replace NAD⁺; FAD accepts two electrons, becomes FADH₂.

This is only a general outline. There is much that has been discussed and presented in lecture that is not included in this outline. All material discussed in lecture is test-material whether or not it is included in this outline.

Ap Biology Chapter 7

Rachel S Tattersall



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