

Quiz #7 Key, Spr. 2013 – all sections:

1. Define:

Allosteric inhibitor – An allosteric inhibitor is a chemical capable of binding to an enzyme at a site other than the active site, and thereby changing the molecular configuration of the protein such that the active site will no longer bind with the enzyme's normal substrate. Allosteric inhibition occurs commonly in association with feedback inhibition of enzymatic pathways.

Glycolysis – Glycolysis is a metabolic pathway allowing glucose molecules to be catabolized forming pyruvic acid molecules (two per glucose). In association with this catabolism, two molecules of ATP are formed (net yield), and two molecules of NAD are reduced to form NADH + H⁺. Glycolysis can be part of fermentation or cellular respiration, and is also called the Embden-Meyerhof Parnas pathway.

Cytochromes – Cytochromes (cell colors), are pigmented enzymes with iron prosthetic groups, often occurring as integral and sometimes peripheral proteins of membranes (prokaryotic cell membranes, cristae and thylakoids all carry cytochromes). Cytochromes can be alternately reduced and oxidized in association with the electron transport chains in both oxidative and photophosphorylation, and they move hydrogen protons through membranes generating proton gradients (the proton motive force).

2. Exoenzymes are active outside cells and are typically involved in the catabolism of large organic compounds such as polysaccharides and proteins. They break these potential carbon and energy sources into small units (monomers) more readily taken into cells.

3. Conjugated/ coenzymes

4. Oxidation

5. Constitutive

6. Pyruvic acid/ homofermentative

7. Enzyme activity is influenced by temperature, pH, light, concentration, etc.

8. Kinase/ isomerase

9. Cellular respiration/ Krebs cycle (citric acid cycle, tricarboxylic acid cycle, TCA cycle, etc.)

10. Pyruvate decarboxylase complex/ acetyl coenzyme-A or acetyl co-A

11. Carbon dioxide is formed by the decarboxylation of organic acids just prior to and during the Krebs cycle. First the two pyruvic acid molecules formed through glycolysis are decarboxylated (prior to the Krebs cycle), then two isocitric acid molecules, and two α -ketoglutaric acid molecules are decarboxylated during the Krebs cycle. Each six-carbon glucose molecule is completely catabolized to yield six molecules of CO_2 . The extra hydrogen protons and electrons associated with each carboxyl group are passed to NAD molecules forming $\text{NADH} + \text{H}^+$.

12. Substrate level/ oxidative/ ATP synthase

13. Within prokaryotic cells, the chemical reactions of glycolysis and the Krebs cycle occur in the same area (are not separated by a membrane), and all the coenzymes reduced in association with these processes can pass electrons to the integral proteins of the electron transport chain with equal efficiency. In the case of eukaryotic cells, glycolysis occurs in the cytoplasm, but the reactions of the Krebs cycle occur within mitochondria (in the matrix of these organelles). The cytochromes involved in electron transport, and ATP synthase enzymes are bound to the inner folded membranes (cristae) of the mitochondria, pyruvate must be transported across these membranes for complete catabolism, and the NAD molecules reduced during glycolysis cannot readily pass their electrons to the electron transport chain. Structural differences make eukaryotic cells less efficient.

The etiological agents of Lyme disease are identified as *Borrelia burgdorferi*.