

Chapter 17 Questions
Electron Transport and Oxidative Phosphorylation

- 1) Book Study exercises 2, 4, 7 question 2 – 4, 6 - 8.
- 2) Which of the following electron transfer system complexes contains a non-heme copper
 - a) Site I
 - b) Site II
 - c) Site III
 - d) Site IV
 - e) Outasite
- 3) Naturally occurring uncoupled mitochondria
 - a) is found in non-hibernating animals
 - b) occurs in hot conditions where ATP synthesis is required
 - c) is likely to happen in the backs of some women
 - d) is very dangerous to infants
 - e) occurs in muscle where it can hydrolyze ATP for movement
- 4) Which of the following portion of the electron transport chain is soluble in the cytosol?
 - a) ubiquinone
 - b) cytochrome c
 - c) cytochrome C oxidase
 - d) Fe-S centers
 - e) site II of the ETS
- 5) The target in the respiratory chain for cyanide is
 - a) Site I
 - b) Site II
 - c) Site III
 - d) Site IV
- 6) Which of the following enzymes does not directly link to the electron transport system?
 - a) malate dehydrogenase (MDH)
 - b) succinate dehydrogenase
 - c) the first reductase in β oxidation
 - d) Site II
- 7) Which of the following complexes does not pump protons during electron transfer
 - a) Site I
 - b) Site II
 - c) Site III
 - d) Site IV
- 8) Why are there so many similar components of the electron transport system and how can there be more than one of the same kind and still have a transfer of electrons?
- 9) Explain why the glycerol-3-phosphate shuttle results in only two ATP's per cytosolic NADH, whereas the malate-aspartate shuttle results in three ATP's per cytosolic NADH. You do not have to draw out the structures in the shuttles.
- 10) The target for the respiratory chain poison by carbon monoxide is?
 - a) Cytochrome a
 - b) Cytochrome b
 - c) Cytochrome Oxidase

d) UQH₂ Reductase

11) Which is not an electron carrier in the electron transport system?

- a) Lipoate
- b) Quinone
- c) Cytochrome c
- d) Flavin

12) Which of the following enzymes is responsible for detoxification of the intermediates produced during of O₂ reduction to H₂O.

- a) Oxygen reductase
- b) Catalase
- c) Cytochrome c
- d) Gitoutaherease

13) Which electron system complex does NOT cause the release of protons into the inner mitochondrial space?

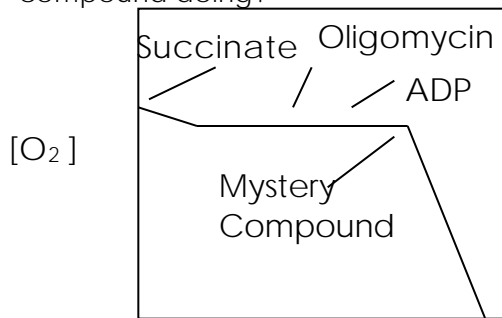
- a) Complex I
- b) Complex II
- c) Complex III
- d) Complex IV

14) The standard reduction potentials at pH 7.0 (E° '), for oxaloacetate and NAD⁺ are given below. Which of the spontaneous reactions described will occur when NADH, NAD⁺, malate and oxaloacetate are mixed at standard state conditions?

<i>oxidant</i>	<i>reductant</i>	<i>E'</i>
<i>oxaloacetate + 2 H + 2 e⁻ -></i>	<i>malate</i>	<i>-0.18V</i>
<i>NAD + 2 H + 2 e⁻ -></i>	<i>NADH</i>	<i>-0.32V</i>

- a) Oxidation of malate by NAD⁺
- b) Oxidation of NADH by oxaloacetate
- c) Reduction of NAD⁺ by malate
- d) Reduction of oxaloacetate by NAD⁺
- e) Oxidation of NADH by malate

15) Describe the what is happening in the following graph, and what is the mystery compound doing?



Time

16) Explain why oxygen is the ultimate electron acceptor?

17) Explain the discrepancy in ATP formation in muscle vs. liver. Assume proton's pumped, membrane efficiency are the same for these tissues.

18) In a chemistry handbook, the redox potential for purified Heme B_L and B_H are the same, yet electron transfer can take place. How?

19) T/F The ATP formation is coupled to the energetically favorable influx of H⁺ catalyzed by a proton translocaseing ATPase

20) Which of the following components of the electron transport system is unlike the others in terms of the number of electrons transferred

- a) cytochrome B
- b) FADH₂
- c) NADH
- d) ubiquinone

21) T /F concerning heme proteins: The heme is covalently bound for each of the cytochromes and does not effect the redox reactions

22) Identify which of the ETS complexes that do not contain (an) Fe-S center(s)

23) Identify the only mitochondrial ETS complex that contains a bound FAD.

24) If succinate dehydrogenase directly donates its electrons to the ETS, why doesn't malate dehydrogenase

25) What is the difference in reducing equivalents shuttled by the aspartate malate shuttle and the glycerol 3- phosphate dihydroxyacetone phosphate transfer?

26) What part of the ETS is responsible by the mitochondrial genome. Why are these types of diseases maternally linked?