TIME Instructional Resources

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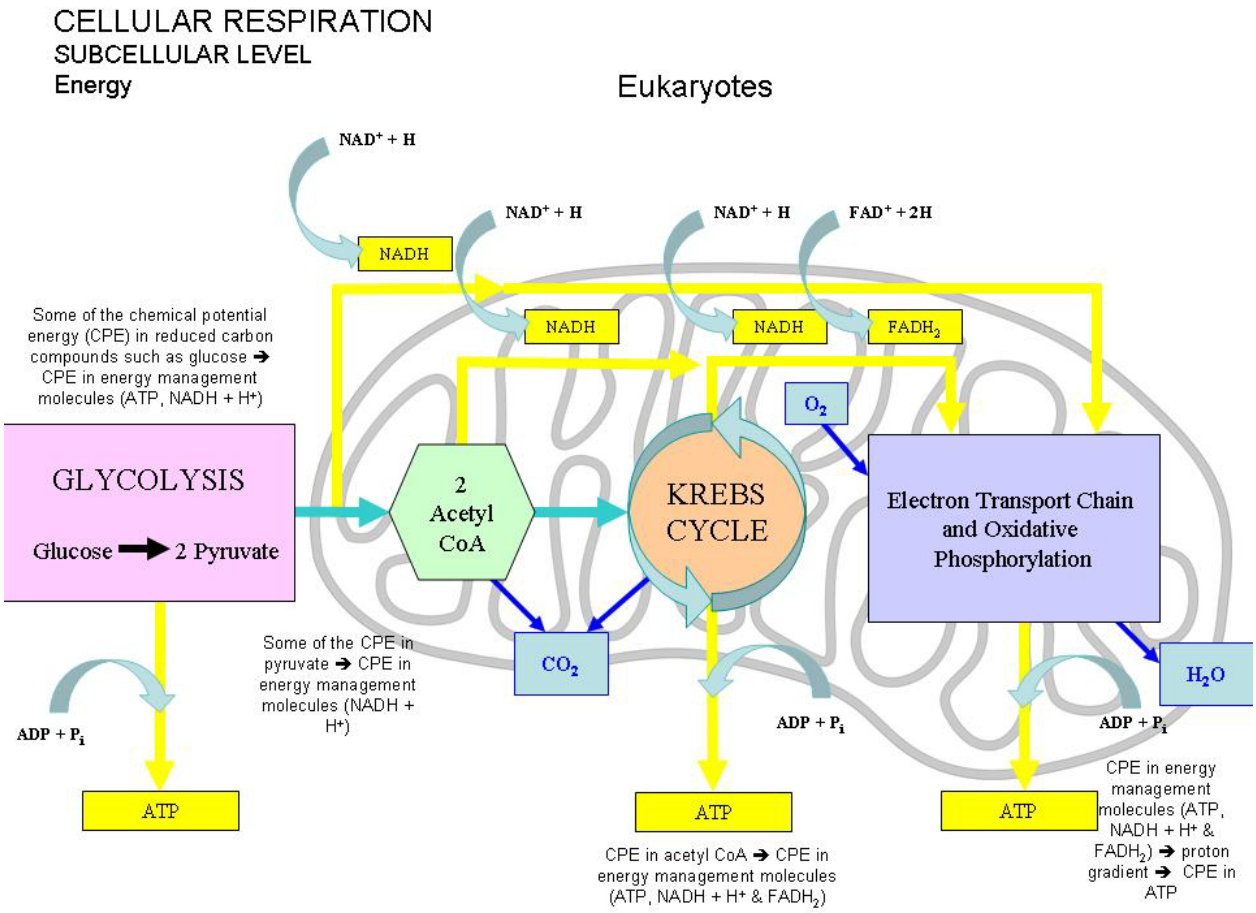
NSF - #0736947

TIME – Cellular Respiration

ETC and OP – following the energy



Following the Electron Transport Chain (ETC) and Oxidative Phosphorylation, the chemical potential energy of a glucose molecule entering cellular respiration has been transferred to ATP. Indicate whether each of the statements below is true or false regarding this process.

A. The chemical potential energy of NADH and FADH2 is transferred to ATP in ETC/OP.
B. A proton gradient (more H^+s on one side of a membrane than the other) drives the formation of ATP from ADP and Pi.
C. There is a chemical energy decrease between NADH entering the ETC and the formation of oxygen, then end product of ETC/OP.
D. The bond energy of glucose is captured primarily by a series of redox reactions which generate a proton gradient.
E. There is a chemical energy increase between NADH entering ETC and the formation of oxygen, the end product of ETC/OP.
F. The bond energy of glucose has been transferred to the bond energy of ATP.
G. The chemical potential energy for oxidative phosphorylation comes from oxygen.
H. Glucose and other molecules that enter cellular respiration are transformed into energy and used up.

ANSWERS:

A. True
B. True
C. True
D. True
E. False
F. True
G. False
H. False

TIME – Cellular Respiration

ETC and OP: energy transfers

Chemical potential energy is transferred between substances in ETC/OP. This energy ends up in the bonds of ATP. What is the correct sequence of energy transfers?

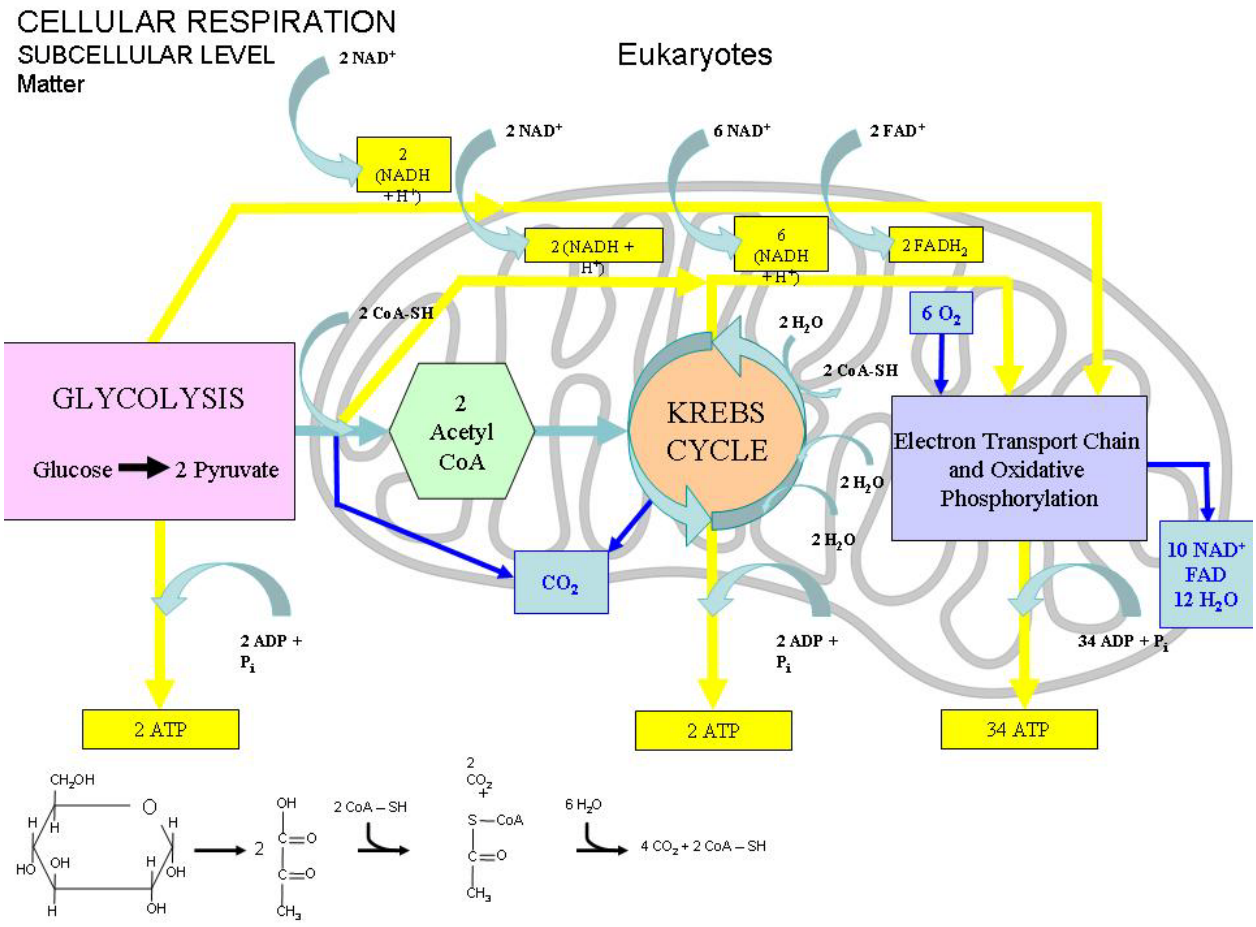
A. NADH → proteins in ETC → proton gradient → ATP
B. NADH → proteins in ETC → oxygen → ATP
C. NADH → proton gradient → ATP synthase → ATP
D. NADH → ATP synthase → ATP

ANSWERS:

A. True
B. False
C. False
D. False

TIME – Cellular Respiration

Inputs and outputs of ETC and OP



Matching: Indicate whether the substances below are an input, output, both an input and output, or neither an input nor an output of the Electron Transport Chain and Oxidative Phosphorylation.

A. input
B. output
C. both
D. neither

1. water
2. FAD
3. NAD+
4. carbon dioxide
5. ATP
6. oxygen
7. $FADH_2$
8. ADP

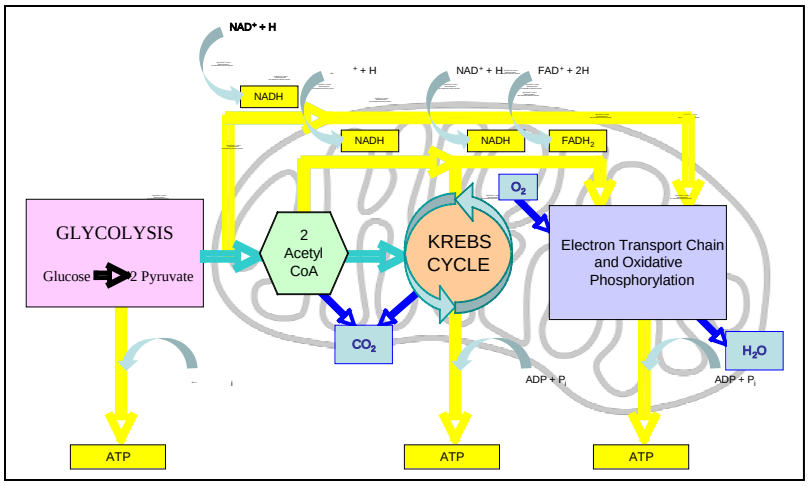
9. NADH

ANSWERS:

1. B
2. B
3. B
4. D
5. B
6. A
7. A
8. A
9. A

TIME – Cellular Respiration

Electron Transport Chain and oxidative phosphorylation – matter



The Electron Transport Chain (ETC) and Oxidative Phosphorylation (OP) are the last reactions of cellular respiration. Indicate whether the following statements about these processes are true or false.

A. CO_2 is an input to the ETC.
B. NADH and $FADH_2$ are inputs to the ETC.
C. In the ETC, some of the carbon in NADH is converted to energy.
D. NADH and $FADH_2$ are inputs to the ETC.
E. NAD+ is an input of OP.
F. ADP is an input of OP.
G. NAD+ is an input to the ETC.
H. ADP is an input of the ETC.

ANSWERS:

A. False
B. True
C. False
D. True
E. False
F. True
G. True
H. False