What is the Krebs Cycle?

Worksheet

The Krebs cycle oxidizes acetyl-CoA to CO2, producing NADH and FADH2 per turn; oxidative phosphorylation then uses these carriers in the electron transport chain to synthesize the bulk of a cell's ATP via chemiosmosis.

Questions

1. Where does the Krebs cycle take place?

A) Cytoplasm
B) Mitochondrial matrix
C) Nucleus
D) Inner mitochondrial membrane

2. How many NADH are produced per turn of the Krebs cycle?

A) 1
B) 2
C) 3
D) 6

3. What is regenerated at the end of each Krebs cycle turn?

A) Glucose
B) Oxaloacetate
C) Acetyl-CoA
D) Pyruvate

4. Where does oxidative phosphorylation occur?

A) Cytoplasm
B) Inner mitochondrial membrane
C) Mitochondrial matrix
D) Nucleus

5. One turn of the Krebs cycle produces 3 NADH and 1 FADH2. Using ATP yields of 2.5 per NADH and 1.5 per FADH2, how much ATP comes from oxidative phosphorylation for one turn?

6. One glucose molecule yields 2 acetyl-CoA, so the Krebs cycle turns twice. How much total NADH does the Krebs cycle alone produce per glucose?

7. Using 10 NADH and 2 FADH2 from a full glucose breakdown (glycolysis + Krebs + pyruvate oxidation combined), estimate the total oxidative phosphorylation ATP.

8. Define: Where does the Krebs cycle occur?

9. Define: What goes into the Krebs cycle each turn?

10. Define: What does the Krebs cycle produce per turn?

Answer Key

1. B) Mitochondrial matrix - The Krebs cycle enzymes are located in the mitochondrial matrix.

2. C) 3 - Each turn produces 3 NADH, 1 FADH2, 1 ATP and 2 CO2.

3. B) Oxaloacetate - Oxaloacetate is regenerated so it can accept a new acetyl-CoA and continue the cycle.

4. B) Inner mitochondrial membrane - The electron transport chain and ATP synthase are embedded in the inner mitochondrial membrane.

5. ATP = NADH2.5 + FADH21.5 ATP = 32.5 + 11.5 ATP = 7.5 + 1.5 = 9 ATP

6. NADH per turn = 3 Total NADH = 3 2 turns = 6 NADH

7. ATP = 102.5 + 21.5 ATP = 25 + 3 = 28 ATP

8. In the mitochondrial matrix.

9. One acetyl-CoA molecule combines with oxaloacetate.

10. 3 NADH, 1 FADH2, 1 ATP (or GTP), and 2 CO2.