

What is Mitochondria and ATP Production?

Worksheet

Mitochondria produce ATP through cellular respiration: glycolysis, the Krebs cycle, and oxidative phosphorylation (electron transport chain), yielding roughly 30-32 ATP per glucose molecule.

Questions

1. Where in the cell does the electron transport chain occur?
 - A) Cytoplasm
 - B) Nucleus
 - C) Inner mitochondrial membrane
 - D) Golgi apparatus
2. Approximately how much ATP does one glucose molecule yield via aerobic respiration?
 - A) 2 ATP
 - B) 4 ATP
 - C) 30-32 ATP
 - D) 100 ATP
3. What gas is required for the electron transport chain to function?
 - A) Nitrogen
 - B) Oxygen
 - C) Hydrogen
 - D) Carbon dioxide
4. What is the mitochondria commonly called?
 - A) The cell's brain
 - B) The powerhouse of the cell
 - C) The cell's skeleton
 - D) The protein factory
5. How much ATP is produced per glucose molecule in aerobic respiration?
6. A muscle cell processes 5 glucose molecules aerobically. Estimate total ATP.
7. Why does anaerobic respiration (no mitochondria involvement beyond glycolysis) yield far less ATP?
8. Define: What is the mitochondria's main job?
9. Define: What are the three stages of cellular respiration?
10. Define: Where does the Krebs cycle occur?

Answer Key

1. C) Inner mitochondrial membrane - The ETC is embedded in the inner mitochondrial membrane.
2. C) 30-32 ATP - Glycolysis + Krebs + ETC together yield roughly 30-32 ATP.
3. B) Oxygen - Oxygen is the final electron acceptor in the ETC.
4. B) The powerhouse of the cell - Because it generates most of the cell's ATP, mitochondria are called the powerhouse of the cell.
5. Glycolysis: 2 ATP (net) Krebs cycle: 2 ATP Electron transport chain: ~26-28 ATP Total: ~30-32 ATP per glucose
6. ATP per glucose 30 Total = 5 30 = 150 ATP
7. Without oxygen, the electron transport chain cannot run Only glycolysis proceeds, yielding just 2 ATP per glucose That is about 15 times less than full aerobic respiration
8. To produce ATP through cellular respiration - the cell's main energy currency.
9. Glycolysis, the Krebs cycle, and the electron transport chain (oxidative phosphorylation).
10. In the mitochondrial matrix.

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