3.4.1 THE SITE/PLACE OF CELLULAR RESPIRATION

Introduction

Cellular respiration occurs inside living cells where food molecules are broken down to release energy. Different stages of respiration occur in specific parts of the cell.

Cytoplasm and Respiration

The first stage of respiration called glycolysis takes place in the cytoplasm. During glycolysis, glucose molecules are partially broken down into pyruvate.

Mitochondria as the Main Site

Most stages of aerobic respiration occur inside mitochondria. For this reason, mitochondria are called the powerhouse of the cell.

Structure of Mitochondria

A mitochondrion is surrounded by double membranes. The inner membrane forms folds called cristae, which increase surface area for energy production.

Matrix of Mitochondria

The internal fluid-filled region called the matrix contains enzymes required for respiration reactions.

Cristae Function

Cristae contain important enzymes and electron transport systems that help produce ATP molecules efficiently.

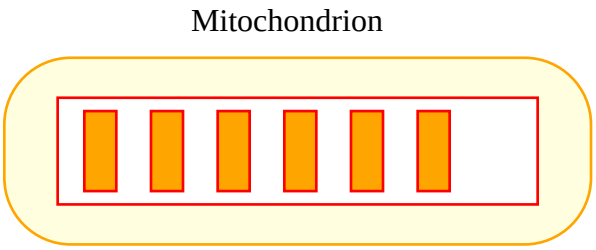
Importance of Mitochondria

Cells that require large amounts of energy, such as muscle cells, contain many mitochondria.

Anaerobic Respiration Site

Anaerobic respiration occurs mainly in the cytoplasm because oxygen is not involved.

Figure: Structure of Mitochondrion



Cristae increase surface area for respiration

Important Structures

Part	Function
Cytoplasm	Site of glycolysis
Mitochondria	Main site of aerobic respiration
Cristae	Increase surface area for ATP production
Matrix	Contains respiration enzymes
Inner Membrane	Contains electron transport system

Summary

Cellular respiration occurs in both the cytoplasm and mitochondria. Glycolysis takes place in the cytoplasm, while most aerobic respiration reactions occur inside mitochondria. Cristae and matrix structures support efficient ATP production.

Questions and Answers

Where does glycolysis occur?

Glycolysis occurs in the cytoplasm.

Why are mitochondria called powerhouses?

Because they produce most cellular ATP.

What are cristae?

Cristae are folds of the inner mitochondrial membrane.

What is found in the matrix?

Respiration enzymes are found in the matrix.

Which cells contain many mitochondria?

Highly active cells such as muscle cells.

Study Notes

• Glycolysis occurs outside mitochondria.
• Aerobic respiration mainly occurs inside mitochondria.
• Cristae increase ATP production efficiency.
• The matrix contains important enzymes.
• Double membranes surround mitochondria.
• Active cells contain many mitochondria.
• Cytoplasm supports anaerobic respiration.
• Mitochondria generate cellular energy.