



Cellular Respiration

Science
TVO 1988

Biology SOL: BIO.3 (all programs)

6 10-minute programs for grades 11-12
One Year Tape and Keep Rights
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This series uses computer animation to illustrate some facets of cellular respiration. The series begins by examining the essential fuels and machinery used by living forms to sustain themselves. The fuel glucose is then broken down through the processes of glycolysis, the Krebs cycle, and oxidative phosphorylation. Finally, the connections between the processes of cellular respiration and nutrition are examined.

101. The Cell and Energy

The cell's energy molecule, glucose, is examined, and the process of extracting energy from glucose and transferring it to ATP in specific organelles called mitochondria is discussed. The structure, function, and evolution of these organelles are illustrated in relation to their role in cellular respiration.

102. Glycolysis 1

This program begins with the discovery of the energy role played by the cell cytosol, the starting point of cellular respiration. Computer animation is used to follow the sequential breakdown of glucose through the process of glycolysis that leads to the production of ATP molecules.

103. Glycolysis 2

Continuing with the second half of the glycolysis process, the energy intermediate molecule NADH is introduced. The glycolytic breakdown of glucose continues, ending with the

production of the molecule pyruvate. Also, a look at how simple life-forms produce alcohol.

104. The Krebs Cycle

The chemical process known as the Krebs Cycle is examined in detail. The cyclical metabolism of pyruvate and the subsequent generation of NADH inside the cell mitochondrion are illustrated in three-dimensional computer animation.

105. Oxidative Phosphorylation

Occurring across the inner membrane of the mitochondrion organelle, this process is shown to depend on the creation of a hydrogen gradient that in turn drives the synthesis of ATP molecules. The program totals the ATPs produced from a single glucose molecule through the combined process of glycolysis, the Krebs cycle, and oxidative phosphorylation.

106. Metabolism and

Nutrition

This program examines the role of ATP in biological systems and looks in detail at one specific example of ATP use, the action of muscle fibers. The interplay of the three food groups in the processes of cellular respiration is then illustrated in the context of human nutrition.