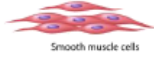


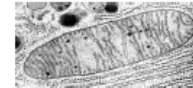
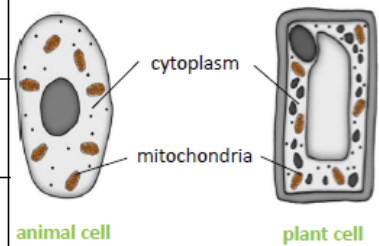


During long periods of vigorous activity muscles become fatigued and stop contracting efficiently

An organism will receive all the energy it needs for living processes as a result of the energy transferred from respiration	<i>For movement</i>	 Smooth muscle cells	To enable muscles to contract in animals.
	<i>For keeping warm</i>		To keep a steady body temperature in a cold environment.
	<i>For chemical reactions</i>		To build larger molecules from smaller one.



Electron micrograph of a mitochondrion

During exercise the human body reacts to increased demand for energy	<i>Heart rate increases</i>	Top pump oxygenated blood faster to the muscle tissues and cells.
	<i>Breathing rate and breath volume increase</i>	This increases the amount of oxygen entering the blood stream.

## Response to exercise

## Respiration

### AQA GCSE Respiration

Respiration is an exothermic reaction. It occurs continuously, to supply cells with ATP

Cellular respiration is an exothermic reaction which is continuously occurring in all living cells

**Anaerobic respiration in plant and yeast cells**

*The end products are ethanol and carbon dioxide. Anaerobic respiration in yeast cells is called fermentation*

**glucose → ethanol + carbon dioxide**

This process is economically important in the manufacture of alcoholic drinks and bread.



**Anaerobic respiration**

*Respiration when oxygen is in short supply. Occurs during intensive exercise*

During hard exercise, muscle cells are respiring so fast that blood cannot transport enough oxygen to meet their needs.

Glucose is partially oxidised to produce lactic acid which builds up in muscle tissue causing them to become painful and fatigued.

**glucose → lactic acid**

*Anaerobic respiration releases a much smaller amount of energy per glucose molecule than aerobic respiration.*

The incomplete oxidation of glucose causes a build up of lactic acid and creates an oxygen debt.

**Aerobic respiration**

*Respiration with oxygen. Occurs inside the mitochondria continuously*

Glucose is oxidised by oxygen to transfer the energy the organism needs to perform its functions.

**6O<sub>2</sub> + C<sub>6</sub>H<sub>12</sub>O<sub>6</sub> → 6CO<sub>2</sub> + 6H<sub>2</sub>O**

**glucose + oxygen → carbon dioxide + water**

*Aerobic respiration releases a large amount of energy from each glucose molecule*