

Ecosystems

3. Respiration

CONCEPT 2

LESSON GUIDE

EXPLORING RESPIRATION IN SPORT

PRECISE LEARNING POINTS

KNOW

I know when anaerobic respiration happens.

APPLY

I can apply my knowledge to write the word equation for anaerobic respiration, and to explain oxygen debt.

EXTEND

I can extend my knowledge to explain how the human body stores glucose for respiration.

NOTES

It is really important as a sportsperson or athlete that you understand how your body works. When you exercise steadily, you gain enough **oxygen** to carry out **aerobic respiration**. This means that for exercises such as jogging or swimming over a long distance your body respire in the normal way.

However, when athletes need to sprint, this requires a **burst of energy**. When this happens, your body cannot get **enough oxygen** needed to respire aerobically, to meet the **energy requirements** of the **muscles**. The **muscles** still need **energy** as they are working really hard, so energy needs to be released from **glucose** without the need for oxygen. This only occurs for a **short time** as there are consequences for the body when respiring this way.

Respiration without oxygen is called **anaerobic respiration**.

Anaerobic respiration is important in sprinting and weightlifting. Some other sports have periods of steady exercise and short bursts of energy so will rely on both anaerobic and aerobic respiration.

Anaerobic respiration can be shown using the **equation**:

Glucose --> lactic acid (+energy)

Although anaerobic respiration does release **some energy** it does not release as much as aerobic respiration, so is **less efficient**.

Lactic acid is the **product** of anaerobic respiration and can **build up** in **muscle cells**. This can cause **cramp** and **aching muscles** during or after exercise.

To **get rid** of the **lactic acid**, it needs to be combined with **oxygen** so it can be safely removed. The lungs need to inhale oxygen to 'payback' the oxygen to muscle cells needed to get rid of the lactic acid. The amount of oxygen required to get rid of the lactic acid is known as an **oxygen debt**. This is why you continue to breathe deeply even after you have stopped exercising, because you 'owe' your cells oxygen to remove the lactic acid that built up during **anaerobic respiration**.

Animals have developed ways of **storing glucose** meaning that they can **slowly release energy** when it is needed.

Some of the ways that animals store glucose are as follows:

- As **glycogen** in **muscles**
- As **glycogen** in the **liver**
- In **fat reserves**

It is necessary to make sure you are taking in **sufficient amounts** of **energy** in the **food** you eat to meet your energy demands. Once your body uses up all energy stores, such as glycogen and fat, protein in the body may start to be used as a last resort.