

Energy supply and the effects of exercise on the body



UNTAMED
EDUCATION

1.3 Anatomy and physiology

Glucose

Oxygen

Aerobic Respiration

Carbon dioxide

Anaerobic Respiration

Energy Supply and the Effects of Exercise on the Body

Lactic Acid

Cool Down

EPOC

Energy

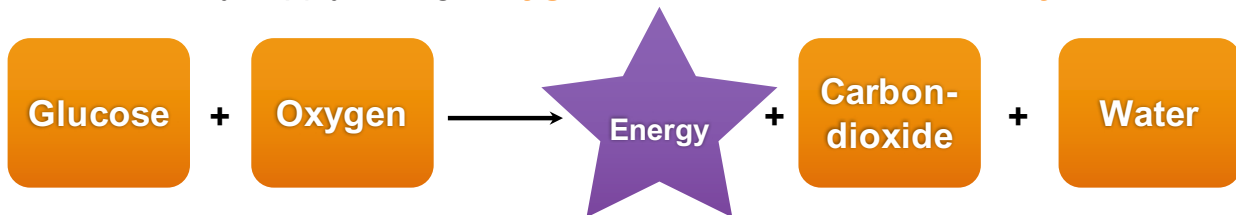
Oxygen Debt



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1. Aerobic respiration

- ▶ **Aerobic respiration** is when **we use oxygen** to create energy.
- ▶ We can usually supply enough **oxygen** for **low to medium intensity activities**.



- ▶ **Long distance/low intensity** sports such as cycling, running and swimming use the aerobic system.

2. Anaerobic respiration

- ▶ **Anaerobic** respiration is when we **do not take enough oxygen** in to **meet high energy demands**.
- ▶ This might be when we are **working at full intensity for a short amount of time** i.e. **sprinting** or **throwing**.
- ▶ Glucose is **broken down without oxygen**.
- ▶ As a result a waste product called **lactic acid** is produced which reduces performance.



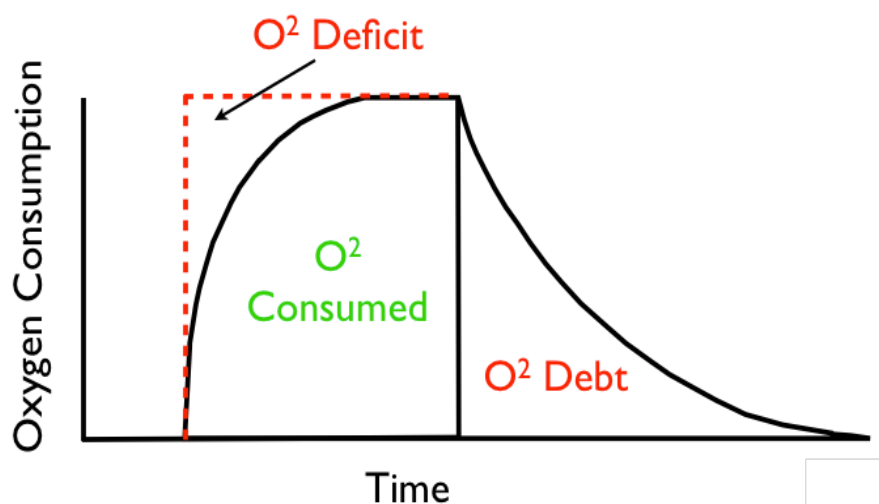
3. Excess Post-Exercise Oxygen Consumption (EPOC)

- ▶ **During recovery** we continue to **consume a large volume of oxygen**.
- ▶ This **extra amount** that is consumed after exercise compared to rest is called our **oxygen debt**.



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- ▶ When we exercise **anaerobically our oxygen debt increases** as we are forced to breakdown glucose without oxygen which creates lactic acid.
- ▶ The excess oxygen consumed is used to **remove lactic acid**.



4. Recovery

Cool Down - After taking part in physical activity you should do some **light exercise** and **stretch thoroughly** to aid recovery.

- ▶ Prevents soreness.
- ▶ Elevated heart rate and breathing rate **clears lactic acid**.

Players can also do a number of other activities to **aid recovery**.

1. **Eat** - Carbohydrates replace energy used in exercise.
2. **Drink water** - Rehydrates the body after losing fluids through sweating.
3. **Rest** - Allows the muscles to repair themselves.
4. **Plunge pools of ice-cold water** - Reduces Delayed Onset of Muscle Soreness (DOMS).
5. **Compression garments** - Reduces swelling.





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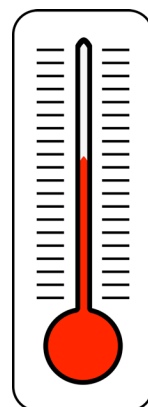
5. Heart Rate

- ▶ When you start to exercise the **heart rate increases**.
- ▶ This coupled with an **increased stroke volume** increases the **cardiac output** resulting in an increased **blood flow** and better **oxygen** delivery.
- ▶ The increase in heart rate depends on the intensity of the exercise. Intense exercise results in a **large increase** in the heart rate.



6. Increased Temperature

- ▶ When **energy** is **produced** and muscles contract **heat** is **created**.
- ▶ **Increased muscle contractions** result in a large **increase** in **temperature**.
- ▶ The body redirects the blood to the **surface of the skin** so it can be removed.
- ▶ **Heat is lost** through evaporation (sweating), radiation and convection.
- ▶ The **skin** becomes **hot**, **red** and **sweaty**.

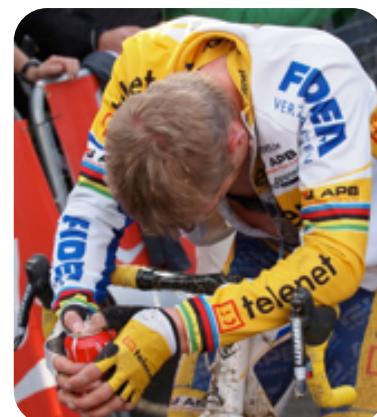


7. Respiratory Changes

- ▶ **Breathing rate increases**.
- ▶ **Depth** of breathing increases, resulting in an increase in **tidal volume**.
- ▶ **Increased gaseous exchange** of oxygen and carbon dioxide at the lungs.

8. Other changes

- ▶ During prolonged performance and **anaerobic** respiration lactic acid is produced. This makes the **muscles fatigue (DOMS)** and you will feel tired.
- ▶ Performers must eventually **stop** due to **cramp**.
- ▶ Feel **light headed**.
- ▶ Experience **nausea**.





9. Long-term effects of exercise

- ▶ **Resting heart rate decreases (bradycardia).** 60 beats per minute in an adult is considered bradycardia.
- ▶ Change in body shape. **Increased lean body mass.**
- ▶ **Improvements in specific components of fitness** such as muscular endurance, cardiovascular endurance, speed, suppleness (flexibility) and strength. These improvements depend on the type of exercise you perform.
- ▶ **Increase in stamina** so you can exercise for longer.
- ▶ **Muscles** increase in **size** and **strength** (**hypertrophy**).
- ▶ Increased **red blood cell** production
- ▶ Arteries (blood vessels) grow **larger** and more **elastic** so blood pressure is **reduced**.
- ▶ **Lactic acid** is removed more efficiently.
- ▶ Decreased **recovery** time.
- ▶ **Increase lactic acid tolerance.**
- ▶ **Increased gaseous exchange.**

