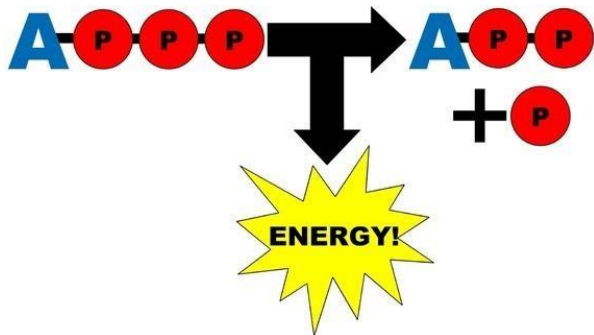


BTEC Sport Year 12-Unit 1 Learning aim E-The effects of exercise on the energy systems

What is the role of ATP in exercise?

- Energy is needed for muscle fibres to contract
- This comes from the breakdown of foods
- ATP (adenosine triphosphate) is the energy currency of the body
- Stores and releases chemical energy
- Gives energy for immediate muscle contractions



- Energy is released by converting ATP to ADP (the uncharged form)

What is the ATP-PC system?

Anaerobic (doesn't need oxygen to produce energy)

Used in sports where sudden and powerful movements are needed.
Eg shot putt

Only lasts for up to 10 seconds

Muscle cells also contain creatine phosphate (high energy). When this high energy bond is broken, the energy it releases is transferred to ADP to resynthesize ATP

What is the lactate system?

Short term energy system

Anaerobic

Longer and higher intensity activities than ATP-PC. Eg-400m

Lasts 60-90 seconds

ATP is made by breaking down glucose and glycogen through aerobic glycolysis

What is the aerobic system?

Lasts for long periods of time (with oxygen)

Aerobic site of reaction (mitochondria).

Breakdown of carbohydrates and fat stores

Process of aerobic glycolysis, Krebs cycle, electron transport chain.

Recovery time between a few hours and 2-3 days

Sports such as long distance running

What is aerobic glycolysis?

- First stage of aerobic metabolism (breakdown of food into energy)
- Converts carbohydrates into pyruvic acid using oxygen
- This requires 10 chemical reactions
- Requires 2 molecules of ATP

What is the krebs cycle?

- Takes place in the mitochondria
- The pyruvic acid is converted to citric acid
- 2 molecules of ATP are produced with carbon dioxide (exhaled by the lungs) and hydrogen (used in the next phase) as waste produce.

E5 and E6

How do the energy systems adapt to exercise?

A-Increased creatine stores

Interval training sessions will improve the ability to produce anaerobic energy. Your body will store more creatine which will improve the ATP-PC system.

B-increased tolerance to lactic acid

- Anaerobic training will make the muscles better at tolerating and clearing away lactic acid
- The capillary network extends so there is more blood to supply the muscles with oxygen and nutrients

C-Aerobic energy system

- Long term exercise will improve the ability to produce energy
- Improvements in the cardiovascular system will allow for more oxygen to be taken to the muscles which is needed to produce ATP

How do the energy systems adapt to exercise?

D-Increased use of fats as an energy store

- Fat is the primary energy source during low intensity exercise
- Fat oxidation increases if exercise is for a long period as glycogen levels deplete
- A trained athlete can burn fat as a fuel because they have more efficient ways of delivering oxygen to the working muscles

E-Increased storage of glycogen and increased numbers of mitochondria

What other factors can affect energy systems?

A-Diabetes and hypoglycaemic attack

- Glucose levels in the blood are too high
- Glucose cannot enter the cells to be used as fuel
- The glucose builds up in the blood and cannot be used
- Hypoglycaemia is a low level of glucose in the blood

B-Children's lack of lactate system

It is harder for children to remove lactic acid after exercise. Therefore, it is recommended that they exercise anaerobically.