



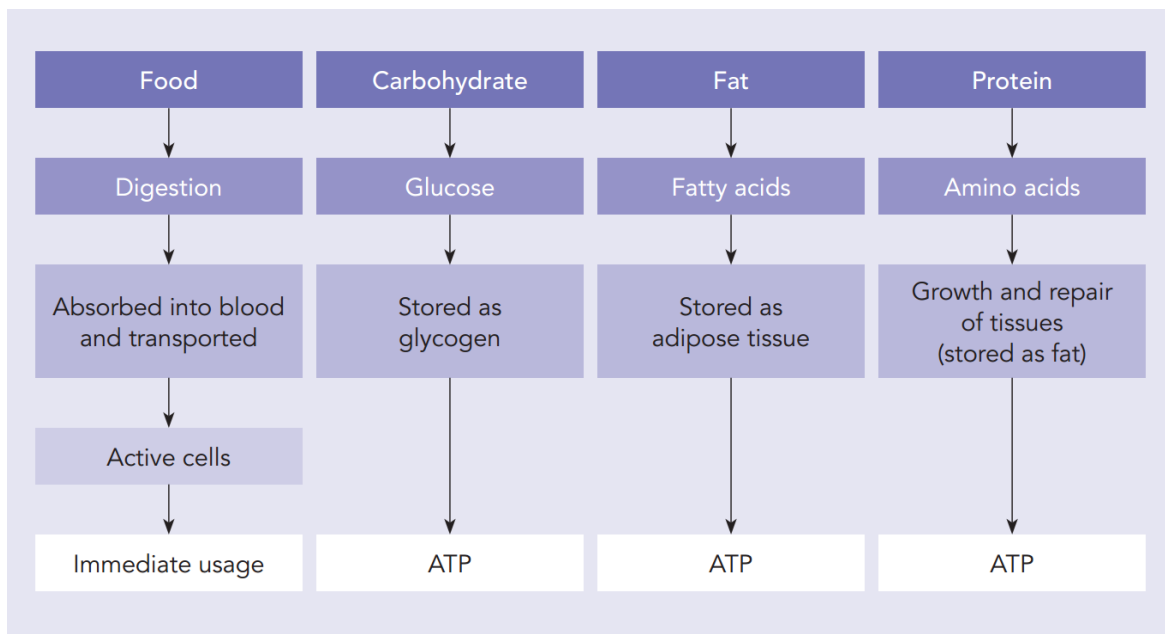
Energy Systems

Energy Sources

- Energy comes from the carbohydrates, fats and protein we consume in our diet. However, before we can use this energy it needs to be broken down into **Adenosine Triphosphate (ATP)**, often referred to as the body's 'energy currency'.

Conversion of food groups into ATP

The diagram below shows the process of the different food groups being broken down in to ATP.



The body's 3 energy systems

- We can only store very limited amounts of ATP in our muscles so when exercise begins, energy demand increases meaning we have to generate more ATP. This can happen in 3 different ways, these are referred to as the body's 3 'energy systems'.
 - **Phosphocreatine (PC) system**
 - **Lactic acid system**
 - **Aerobic system**



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Energy System	Example activities where energy system would predominantly be utilised
PC	100m sprint, shot put, power lifting
Lactic Acid	400m sprint, 50m swim, interval training
Aerobic	Marathon run, 30 minute cycle, 10 minute swim

TASK: Fill in the table below summarising the main characteristics of each energy system. Use the following words...

Low intensity (up to 60% maximum effort), 1 – 3 minutes of intense activity, Fast twitch (type 2a), Anaerobic, 20 minutes – 2 hours (breakdown of lactic acid), Rapid, High Intensity (95 – 100% maximum effort), Stored chemical energy (phosphocreatine), Very limited ATP, Unlimited ATP, No waste products, Lactic acid, No fatiguing waste products (only CO₂, and H₂O), Aerobic, Short duration (0 – 10 seconds), Slow, Limited ATP, Anaerobic, Long duration, Glycogen, High Intensity (60 – 95% of max effort), Glycogen and fat, Quick recovery (30 seconds – 5 minute), Time to eat and drink (replenish fuel stores), Fast twitch (type 2b), Very rapid, Slow twitch (type 1)

	PC System	Lactate System	Aerobic System
Aerobic or Anaerobic			
Speed of energy production			
Energy Source			
Amount of energy produced (ATP)			
Waste products of energy production			
Duration of energy production			
Intensity of activity			
Recovery required			
Predominant muscle fibre types			



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Answer to task

	CP System	Lactate System	Oxygen/Aerobic System
Aerobic or Anaerobic	Anaerobic	Anaerobic	Aerobic
Speed of energy production	Very rapid	Rapid	Slow
Energy Source	Stored chemical energy (phosphocreatine)	Glycogen	Glycogen and fat
Amount of energy produced (ATP)	Very limited ATP	Limited ATP	Unlimited ATP
Waste products of energy production	No waste products	Lactic acid	No fatiguing waste products (only CO ₂ , and H ₂ O)
Duration of energy production	Short duration (0 – 10 seconds)	1 – 3 minutes of intense activity	Long duration
Intensity of activity	High Intensity (95 – 100% maximum effort)	High Intensity (60 – 95% of max effort)	Low intensity (up to 60% maximum effort)
Recovery required	Quick recovery (30 seconds – 5 minute)	20 minutes – 2 hours (breakdown of lactic acid)	Time to eat and drink (replenish fuel stores)
Predominant fibre types	Fast twitch (type 2b)	Fast twitch (type 2a)	Slow twitch (type 1)