



# YMCA Awards

Level 3 Nutrition to support  
physical activity

2018

# Level 3 Nutrition to support physical activity

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**The relationship between nutrition  
and physical activity**

## Learning outcomes

By the end of this session you will be able to:

- Recognise the role of carbohydrate, fat and protein as fuels for aerobic and anaerobic energy production
- Explain the components of energy expenditure and the energy balance equation
- Explain how to calculate an estimate of Basal Metabolic Rate (BMR)
- Explain how to estimate energy requirements based on physical activity levels and other relevant factors

## Glycogen stores

- Glycogen stored in each muscle cell is for the exclusive use of that muscle cell and cannot be transferred
- Liver glycogen stores are primarily reserved to maintain blood glucose levels
- If blood glucose falls the brain stimulates a hunger response in order to obtain fuel, or triggers glycogen breakdown
- During prolonged exercise the brain stimulates the use of amino acids from muscle tissue to convert to glucose - gluconeogenesis

## Factors affecting glycogen storage

- Fitness/training level (trained muscle better at storing glycogen)
- Lean muscle mass (more muscle = more glycogen storage capacity)
- Diet (consistent high carbohydrate intake is essential to replenish glycogen stores)

## How long can glycogen store last?

- Moderately hard activity glycogen stores will last approximately 60-90 minutes
- Normal day-to-day activity - 4-5 hours

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# Strategies to maximise glycogen stores

## Pre-training

- Top up your carbohydrate stores every 4–5 hours
- Eat small regular meals to reflect activity levels throughout the day
- Aim to consume most of the kcal when more active
- Do not go for long periods of time without eating. Hunger tends to cause individuals to consume less healthy foods
- Aim to consume a light meal up to 2 hours prior to training or a larger meal 2–4 hours prior to training
- Aim to consume low GI foods throughout the day to ensure a steady supply of carbohydrate energy
- High GI foods may be beneficial immediately prior to activity to provide an immediate supply of energy



# Strategies to maximise glycogen stores

## During activity

- If the activity/training session lasts more than 90 minutes, consume carbohydrates during the session
- Aim to consume approximately a minimum of 20g of carbohydrates every 30 minutes

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# Strategies to maximise glycogen stores

## **Post-activity**

- After exercise consume enough carbohydrates to restore levels
- Consume them as soon as possible after the training session has finished
- The window of opportunity to refuel after exercise lasts up to 2 hours
- Research suggests that 15mins post-exercise is the optimal time to refuel
- Females aim to refuel with 40–50 g of carbohydrates
- Males aim to refuel with 60–80 g of carbohydrates
- Be realistic with the duration and intensity of the training session. If the session is low intensity and of short duration refuelling requirements will be lower

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## Summary – the role of carbohydrate

- The main function of carbohydrates is to provide energy. Most cells in the body can use a mixture of fat and carbohydrate (and protein when carbohydrate is limited) for energy. Muscle cells rely on carbohydrate for contraction when the exercise intensity is high
- Preservation of carbohydrate stores during aerobic activity is optimal

## Summary – the role of protein

- Protein requirements for aerobic activity should be minimal however an increased intake will compensate for the breakdown of muscle tissue due to depleted glycogen stores
- This will normally take place at around 60–90 minutes of moderately hard endurance training
- The process of converting muscle protein to glucose is called 'gluconeogenesis'
- Protein requirements are increased for strength training to compensate for an increased requirement for muscle repair

## Summary – the role of fat

- Fats are abundant in the body so are the energy fuel of choice
- Aerobic activity should predominantly use fats as their energy source preserving the use of carbohydrates. Fitter individuals use fat oxidation earlier into their workouts
- Anaerobic activities cannot use fat as an energy source due to the lack of an oxygen presence

