

BRITISH SWIMMING WORLD CLASS PROGRAMME

FACT SHEET

The Basics Carbohydrates

Carbohydrates are a key fuel source for exercise. The body stores carbohydrate as glycogen in the muscles and liver, however its storage capacity is limited. Depletion of these carbohydrate stores is associated with fatigue and can impair performance and reduce immune function. Everyday eating and drinking plans need to provide enough carbohydrate to fuel training and optimise the recovery of carbohydrate stores between sessions.

How much carbohydrate do I need?

Carbohydrate needs are dependent on the type, duration and intensity of your training and competition programme and also recovery time available. Carbohydrate intake should reflect daily activity levels. On high intensity training days, carbohydrate should be increased to maximise the benefits of the session and promote recovery. Scheduling carbohydrate rich food choices at meals or snacks around training sessions is a good way of adjusting your carbohydrate intake to the session. As the intensity of training increases so should your carbohydrate intake before, during and after exercise.

Which foods are good sources of carbohydrate?

Many everyday foods and fluids contain carbohydrate but have different features and nutritional content. Carbohydrate foods do not all produce the same response in the body. For this reason they are often divided into categories. Previously, carbohydrates were classified as either simple or complex carbohydrates but recently this has been deemed too simplistic and now the Glycaemic index is often used.

Glycaemic index (GI) ranks how quickly carbohydrate foods raise the blood glucose levels after eating.

- High GI foods (e.g. sweets, sports drinks) are rapidly digested and absorbed by the body, raising blood glucose levels quickly
- Low GI foods (e.g. bananas, porridge) are digested and absorbed much slower causing a gradual increase in blood glucose

It has been suggested that manipulating the GI content of meals may optimise carbohydrate availability for exercise¹. However, this is still a relatively new area of research so more information is needed to provide accurate guidelines about the effects of GI on performance. Visit www.glycaemicindex.com for more information. The table² below may be useful to determine what to eat and when.

Category	Description	Examples	Use for Athletes
Nutrient dense carbohydrates	Good sources of carbohydrate & other nutrients, including protein, vitamins, minerals & fibre	Breads, cereal, grains (pasta & rice), fruit, starchy vegetables, legumes & low fat dairy products	Every day foods that should form the base of an athlete's diet. Help to meet nutritional targets
Nutrient poor carbohydrates	Contain carbohydrate but very minimal or no other nutrients	Soft drinks, energy drinks, sweets, carbohydrate gels & sports drinks	Shouldn't be major part of diet but may provide a compact carbohydrate source around training
High fat carbohydrates	Foods that contain carbohydrate but are also high in fat	Pastries, cakes, chips, crisps and chocolate	"Sometimes" foods best not consumed around training as do not promote optimal recovery

¹ Mondazzi L & Arcelli E. (2009) Glycemic Index in Sport Nutrition. Journal of the American College of Nutrition, 28, 4, 455S-463S

² Adapted from Australian Institute of Sport Nutrition Factsheets 'Carbohydrate- The Facts', www.ausport.gov.au

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When is carbohydrate important?

Everyday eating and drinking plans need to provide enough carbohydrate to support athletic performance and recovery. The timing of carbohydrate before, during and after training and competitions can help you achieve this.

Carbohydrate before exercise

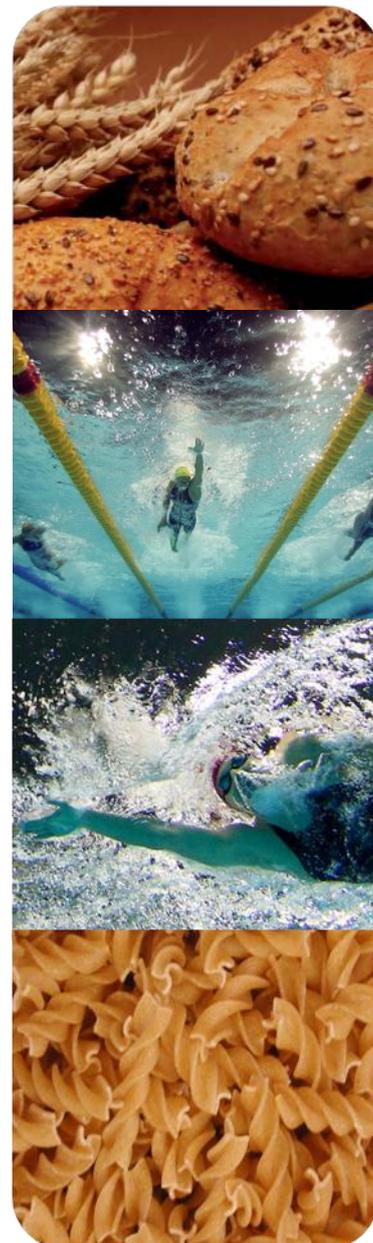
- A carbohydrate rich snack before exercise will top up glycogen stores in the muscle and liver, which is especially important for early morning sessions. It also helps to maintain blood glucose levels, aiding performance.

Refuelling during exercise

- During prolonged exercise, ingesting carbohydrate can prevent the depletion of the body's stores. This can help maintain performance by delaying the decline in exercise intensity and concentration. Ingestion of multiple transportable carbohydrates (glucose and fructose), like those found in many sports drinks, will allow increased use of carbohydrates.

Carbohydrate intake after exercise

- Carbohydrate after training is essential for optimum recovery of carbohydrate stores. Often athletic performance is dependent on the ability to recover from one session to the next, which is likely to be later on the same day, especially during competitions. Incomplete or slow restoration of these carbohydrate stores can lead to reduced ability to train and feelings of fatigue.
- When the gap between training sessions is less than approximately 8 hours (as when training twice daily), carbohydrate intake should begin as soon as possible after the first session to maximise recovery. There may be some advantage in meeting carbohydrate targets through a series of snacks every 30-60minutes during the first few hours of recovery. You should aim to consume **1-1.5g per kg of body mass carbohydrate over several hours**³.
- During longer periods of recovery periods (24 hours), begin with a carbohydrate snack soon after finishing training and then as long as you consume enough carbohydrate it does not appear to matter how intake is spaced throughout the day and can be organised to what is practical and comfortable for you.



For more information on this refer to *Preparation for Competition* and *Recovery Nutrition* fact sheets.

³ Burke LM Refuelling after exercise. In Burke LM & Deakin Clinical Sports Nutrition. Australia, The McGrae-Hill Companies, 2010:358-392.