



FACT SHEET

Eating & Drinking During and After Sport

During most sports, your body's main fuel mix comes from carbohydrate (from muscle glycogen and blood glucose) and fat. Generally, if your sport involves less than an hour of activity, you will perform well without having to refuel during the event. With good food choices, you should be able to fuel up adequately before your sport, and then replace the fuels you have used with your post-event meals. On the other hand, sweat losses accrue from the start of your activity and, in many sports or conditions, may cause a fluid deficit that interferes with performance. This calls for an individualised fluid plan during and after exercise to manage the fluid deficit and replace it after exercise. See fact sheet number 1 on [Fluids in Sport](#).

If your sport or training takes longer than an hour, you may benefit from consuming some carbohydrates during sport in addition to fluid. The decision will depend on the:

- intensity of the exercise (higher intensity burns glycogen more quickly);
- duration (the longer the event, the more carbohydrate is burned);
- ambient temperature (the hotter it is, the quicker glycogen will be burned. But it is also more likely it is that overheating and dehydration will limit performance); and
- how well you have eaten before sport (eating carbohydrate before exercise increases body carbohydrate stores, but also increases the rate at which carbohydrate is burned during exercise).

The benefits of consuming carbohydrate during exercise include:

- a) Keeping blood glucose levels high during prolonged moderate-high intensity events. Blood glucose can provide an alternative fuel source for the muscle when glycogen levels dwindle;
- b) Providing a fuel source for the brain to maintain skills and decision making, and reduce the perception of fatigue; and
- c) Sparing or replenishing muscle glycogen. We think that in some situations, such as low intensity work, carbohydrate consumed during exercise can be burned to spare glycogen stores or can build new glycogen stores for later use.

Fluids

Fluid intake during exercise should aim to match fluid losses so that the overall fluid deficit remains low. Water will replace fluid losses, and is a good choice for sports lasting less than an hour, and perhaps, for situations where you don't need to perform at your best. However, sports drinks have a number of advantages, including a taste that encourages better fluid intake, and the provision of carbohydrate for the benefits mentioned above. They also contain some electrolytes to help you better retain the fluid you drink and to replace the electrolytes lost in sweat. Your individual fluid plan should include strategies for drinking before, during and after your sport. (See [fact sheet #1](#)).

High intensity sport lasting around one hour

Typically, sports that last for less than an hour do not threaten body fuel stores. Good preparation for such a sport should see you well fuelled for at least an hour of sustained or intermittent high-intensity activity. Under these circumstances, it should not be necessary to provide the muscle with additional carbohydrate, and fluid replacement is considered the main nutritional need. However, some recent studies of sustained high-intensity exercise lasting about one hour – such as a 40 km cycling time trial - have produced interesting results. They found that performance was enhanced by consuming carbohydrate immediately before and during the event, even when it couldn't have had a big impact on muscle fuel use. The benefits were attributed to an affect on the brain and nervous system, making subjects feel better and choose a faster pace. It's hard to make strict guidelines for a carbohydrate feeding strategy for such situations because of another intriguing finding. Other studies have found that simply swirling a sports drink in your mouth (setting off receptors in your mouth that recognise carbohydrate) can enhance performance of this type. It seems that even promising the brain that carbohydrate is on the way may be enough to make you feel better and exercise harder. Clearly there is more work to be done before we know to make best use of this information, but it may be worth experimenting with the use of carbohydrate source, like a sports drink, just before and during high-intensity sports lasting 60 minutes.

Sports lasting 60 to 90 minutes

Most team sports and individual events are completed within 90 minutes of action – for example, netball, squash, football, soccer, hockey or a 10 km jog. Your fluid plan should make use of the opportunities to drink during these activities to replace a reasonable proportion of your sweat loss. It is likely that some level of fatigue will occur during these sports to slow you down or impair your skills. Fatigue can often be due to inadequate fuel supplies. Risk factors include not having an opportunity to fuel up in the day prior to your event, going without breakfast before a morning event, or being in a higher intensity sport where fuel is burned faster. If such fuel depletion occurs, it can be addressed by replacing carbohydrate during the event. Again, individual experimentation is important, and targets up to the amounts suggested for endurance sports are a reasonable guide (see next section). It is usually most practical to refuel as part of your fluid plan, by choosing carbohydrate-containing drinks such as sports drinks. However, some athletes like to use gels, confectionery and other easily consumed fuel sources.

Sports longer than 90 minutes

Generally, we think of sports lasting longer than 90 minutes as endurance events – these include marathons, Olympic distance triathlons, and a mid-fielder's role in a game of Australian Rules Football. Fuel fatigue is now more likely, although the durability of muscle glycogen stores will again depend on the rate of fuel use during the sport and the success of pre-event fuelling. A competition fuel plan should be developed in training sessions, to fine tune the timing, type and amount of carbohydrate choices that suit the athlete and the logistics of their sport. Some general guidelines are:

- It seems best to start refueling early in the event rather than waiting for fuel stores to become depleted;
- A carbohydrate intake in the range of 30-60grams per hour works for most athletes;
- Fuel-containing drinks are often able to look after all needs of the event. For example, fuel targets can usually be met by 500-1000 ml of a sports drink per hour; and
- As the length of the event increases (and the intensity is reduced), there may be more opportunity or need to consume solid carbohydrate choices. These can range from special sports foods to confectionery items and everyday foods.

Ultra-endurance events (> 4 hours)

Ultra-distance events have an increased requirement for additional fuel intake during the event. Luckily, because they are undertaken at lower exercise intensities, they usually offer more opportunity to consume a greater variety of carbohydrate sources. Solid foods become more valuable in lengthy events when hunger is possible, and it is also good to have extra choices to reduce the risk of "flavour fatigue". It is easy to become bored with sweet flavours or foods with similar textures when they are consumed for hours on end. Savoury choices, foods of different temperatures suited to the climate, and foods with alternative textures can all become valuable. When the duration and total energy requirements of a sport become large - for example, multi-day cycling or running events - the hours spent exercising may need to be a time for aggressive intake. Ironman triathletes and tour cyclists are often found to consume carbohydrate during their events at higher rates than we have previously recommended – 50 - 90grams per hour. It may also become important to replace salt losses and to consume protein. Athletes (or their handlers) need to be creative in choosing energy and nutrient sources that fit the logistics and requirements of their events, as well as their individual preferences. An experienced sports dietitian should be able to provide specialised and individualised suggestions.

Why should I eat and drink after exercise?

Recovery after a workout or competitive event may encompass a number of nutrition-related processes:

- Refuelling
- Repair and adaptation
- Rehydration

The requirements of recovery will vary according to the nutritional stress caused by the session, the goals of the athlete, and the period of time before the next exercise is due. Typically, the athlete may need to replace fluid (and sodium/salt), carbohydrate and protein. In some situations, the athlete may be able to go straight to their next meal. At other times, it makes sense to have a recovery snack. A range of foods and drinks may fit the bill, and may be tailored to the athlete and their environment. Speedy intake of key nutrients may help to promote recovery, but the athlete's appetite and access to food may limit the type of foods and drinks that are suitable.

Examples of carbohydrate choices during exercise

Each serve provides ~60 g of carbohydrate

- 1 litre sports drink
- 600 ml cola drink
- 1.5 sports bars
- 3 cereal bars
- 2 sports gels
- 3 small or 2 large bananas
- 95 g jelly babies or jelly beans
- 1 round jam sandwiches – thick sliced bread and 2 tablespoon jam
- Liquid meal supplement (~ 5 scoops in water)

Examples of post-exercise snacks

Carbohydrate-focused:

- Sports drinks
- Fruit juice or soft drink
- Banana sandwich
- Fresh fruit, canned fruit
- Sweet muffins
- Breakfast bar, muesli bar
- Sports bar

Carbohydrate + protein focused:

- Fruit smoothie (low-fat milk, banana, yoghurt)
- Liquid meal supplement (e.g. Sustagen Sport)
- Breakfast cereal + milk and fruit
- Sandwich or roll including meat/cheese/chicken in filling
- Baked potato + baked beans + grated cheese

Summary points

- During sporting activities, it is important to have a fluid plan that replaces most of the athlete's sweat loss.
- In events of 60 minutes or longer, replacing carbohydrate during the event may enhance performance.
- Experiment to find a plan that works for you and your sport
- A refueling target of 30 - 60grams of carbohydrate per hour of activity is a good starting point.
- In shorter events, even a small amount of carbohydrate can be useful, while in ultra-endurance events, higher intakes may be needed.
- After exercise, the athlete may speed up their recovery by choosing meals and snacks providing fluid, carbohydrate, protein and salt.