



Fluid - who needs it?

'Don't get into the habit of eating or drinking in a marathon race: some prominent runners do, but it is not beneficial'. J.E. Sullivan 1909

Fortunately, sports science has progressed a long way since then and we now know that the regular ingestion of fluids is essential for sporting performance. Hypohydration (total body water below normal) impairs the body's ability to regulate heat resulting in increased body temperature and an elevated heart rate. Perceived exertion is increased causing the athlete to feel more fatigued than usual at a given work rate. Mental function is reduced which can have negative implications for motor control, decision making and concentration. Gastric emptying is slowed, resulting in stomach discomfort. All these effects lead to impairment in exercise performance. Most types of exercise are adversely affected by hypohydration, especially when they are undertaken in hot conditions, and negative effects have been detected when fluid deficits are as low as 2 % (i.e. a deficit of 1.2 litres for a 60 kg athlete).

The good news is that by drinking regularly during exercise, athletes can prevent declines in concentration and skill level, improve perceived exertion, prevent excessive elevations in heart rate and body temperature and improve performance - good justification for every athlete and coach to make fluid replacement a key priority during training and competition.

How much should athletes drink during exercise?

Fluid requirements vary remarkably between athletes and between exercise situations. Fluid losses are affected by:

- Genetics - some people innately sweat more than others
- Body Size - larger athletes tend to sweat more than smaller athletes
- Fitness - fitter people sweat earlier in exercise and in larger volumes
- Environment - sweat losses are higher in hot, humid conditions
- Exercise Intensity - sweat losses increase as exercise intensity increases

It is possible to prescribe a general fluid replacement plan that will meet the needs of all athletes. Fortunately, athletes can easily estimate their own fluid requirements by weighing themselves before and after exercise sessions. Each kilogram of weight lost is equivalent to one litre of fluid. Adding on the weight of any fluid or food consumed during the exercise session will provide an estimate of total fluid loss for the session. For example, an athlete who finishes an exercise session 1 kg lighter and has consumed 1 litre of fluid during the session has a total fluid loss of 2 litres. The *How Much Do Athletes Sweat?* fact sheet on the AIS Sports Nutrition website discusses sweat losses in athletes.

Once an athlete's individual sweat losses are known, a plan can be prepared to help the athlete achieve better fluid replacement in subsequent exercise sessions. Fluid replacement plans will differ according to the athlete and the opportunities for drinking during the sport. However, where possible it is better to begin drinking early in exercise and adopt a pattern of drinking small volumes regularly rather than trying to tolerate large volumes on one hit. Most athletes can tolerate 200-300 ml every 15-20 minutes but tolerance will vary according to the exercise intensity.

How much do athletes actually drink?

Typically athletes replace 30-70% of sweat losses during exercise. Fluid replacement is an issue for all sports including those such as swimming and water polo conducted in wet environments, and sports conducted in air conditioned stadiums. There are many reasons for athletes failing to drink enough to replace fluid losses. Some athletes are so focused on training or competing that they forget to drink. Some avoid drinking





because they fear stomach discomfort. Drinks need to be cool, palatable and conveniently available or they will not be consumed. The sensation of fluid in the mouth sends nerve signals to the brain that switch off the drive to drink. When low sodium fluids such as water, juice and cordial are consumed, the desire to drink is often switched off before that athlete has consumed sufficient fluid to match sweat losses.

Is it possible to drink too much?

Consuming fluid in excess of requirements may cause some gastrointestinal discomfort. In extreme cases, a condition called hyponatraemia can occur. Hyponatraemia (low blood sodium levels) causes symptoms similar to dehydration and is potentially life threatening. It is not common but can occur in prolonged endurance events (> 2 hours) when large volumes of low sodium drinks are consumed and sweat losses are small. Those most at risk are small females who have long race times. This group of athletes tends to have small sweat losses and plenty of time to consume large amounts of fluid during the event. Consuming sodium-containing fluids such as sports drink and matching fluid intake to sweat loss lowers the risk of hyponatraemia.

What should athletes drink?

Research shows that fluid intake is enhanced when beverages are cool (~15°C), flavoured and contain sodium. This makes sports drinks an ideal choice during exercise. Sports drinks are not gimmicks. They are legitimate products that are well researched and proven to improve fluid intake and performance. A lot of science has gone into developing the flavour profile of sports drinks so that they encourage fluid intake during exercise. In addition, sports drinks contain carbohydrate at a concentration (4-8%) that allows refuelling to take place during exercise.

Several studies demonstrate that use of sports drinks will improve fluid intake. A study conducted with AIS netball and basketball players in 1999 demonstrated better fluid balance with a sports drink compared to water. This is consistently observed across our sporting programs. Even athletes who prefer to drink water during exercise, demonstrate better fluid intake when forced to drink sports drink.

In the past, it was believed that sports drinks only benefited the performance of exercise greater than 90 minutes. However, in recent years, the intake of carbohydrate and fluid has been shown to be beneficial for high intensity exercise of approximately 60 minutes. This makes sports drinks a good option for many types of sporting activity.

Water is still a suitable option during exercise. However, water drinkers need to be aware that water does not stimulate fluid intake to the same extent as sports drinks. Drinking to a plan is therefore crucial when drinking water. Don't rely on thirst.

Cordial, soft drinks and juice generally contain greater than 10% carbohydrate and are low in sodium. This can slow down gastric emptying and makes these drinks a less suitable choice, especially for high intensity activity. Some athletes, exercising at low intensities may tolerate juice, soft drink and cordial but in most situations, sports drinks are the better option.





Which sports drink is the best?

Food standards in Australia place restrictions on the formulation of sports drinks. As a result, sports drinks sold in Australia are very similar in composition. See the table below. Choose a sports drink that has 4-8% carbohydrate, 10-20 mmol/L sodium, is affordable, comes in a convenient package and tastes good.

Drink	CHO %	Sodium (mmol/L)
Gatorade	6	18
Powerade	8	4
Adam's Ale Sport	6	10
Staminade Sport	6.8	10
PB Fluid & Electrolyte Replacement	6.8	25

Summary of Fluid Guidelines

- Begin each exercise session in fluid balance. This requires drinking regularly throughout the day leading up to training or competition. Have a drink with all meals and snacks.
- Immediately, before exercise commences, consume 200-600 ml of fluid.
- Develop a plan for fluid intake for all exercise sessions longer than 30 minutes. Aim to match previous fluid losses as closely as possible (within 1% of body mass). Take into account all the opportunities within the sport.
- Begin drinking early in the exercise session and continue to drink small amounts regularly. Sports drink or water are the best options.
- Replace any residual fluid deficit after exercise. You will need to drink 150% of any fluid deficit in the 4-6 hours after exercise to account for ongoing sweat and urinary losses. When fluid losses are high and/or rapid rehydration is required, sodium replacement may be required. Sports drinks, oral rehydration solutions and salty foods can all contribute to sodium replacement.

What can the coach do?

Drinking during exercise does not come naturally to athletes. It is a skill that needs to be developed and practiced. Coaches can help athletes by:

- Recognising the importance of fluid replacement during exercise and creating a supportive environment
- Arranging for athletes to be well educated regarding hydration
- Assessing fluid balance during training sessions to help athletes determine individual fluid losses
- Helping athletes prepare a fluid replacement plan for training and competition
- Incorporating drink opportunities during training
- Providing cool, flavoured, palatable drinks which are readily accessible during training and competition or establishing team rules designed to encourage fluid intake - i.e. all athletes must bring suitable fluids or a drink bottle to training
- Allowing athletes to practise and fine tune fluid replacement strategies during training in preparation for competition
- Periodically monitoring fluid balance to create an awareness of whether athletes are meeting fluid replacement goals

