

## FACT SHEET FLUIDS IN SPORT

### WHY FLUID IS IMPORTANT

Water is essential for the human body. It is required to maintain blood volume, regulate body temperature and allow muscle contractions to take place. During exercise, the body maintains its optimal body temperature through sweating. Heat is removed from the body when beads of sweat on the skin evaporate, which results in a loss of body fluid. Sweat production (and therefore fluid loss) increases with a rise in ambient temperature and humidity, as well as with an increase in exercise intensity. So while sweat loss during exercise is essential for body temperature regulation, it can lead to dehydration.

Drinking fluid during exercise is necessary to replace fluids lost in sweat. However, in most (elite) cases the rates of sweat loss are higher than the rate of fluid intake. This can lead to a fluid deficit which ultimately increases the likelihood of dehydration. Therefore, fluid guidelines should promote drinking more fluid to reduce the deficit and potential performance detriments associated with dehydration. However, it is also important to acknowledge that it is possible to over-drink during exercise. This highlights the importance of getting to know your sweat rate and knowing how much you should be drinking. Your sports dietitian can help to tailor an individual fluid plan for you.

### DEHYDRATION AND PERFORMANCE

As dehydration increases, there is a gradual reduction in physical and mental performance. There is an increase in heart rate and body temperature, and an increased perception of how hard the exercise feels, especially when exercising in the heat. Impaired skill level can also occur, along with mental fatigue. Studies show that loss of fluid equal to 2% of body mass is sufficient to cause a detectable decrease in performance (that's a 1.4 kg loss in a 70 kg athlete). Dehydration of greater than 2% loss of body weight increases the risk of nausea, vomiting, diarrhoea and other gastro-intestinal problems during and after exercise.

Dehydration also reduces the rate of fluid absorption from the intestines, making it more difficult to reverse the fluid deficit. You may end up feeling bloated and sick if you delay fluid replacement. It is impossible to 'train' or 'toughen' your body to handle dehydration.

### CAN YOU DRINK TOO MUCH?

Drinking more fluid than is comfortable (in any conditions) has the potential to interfere with your performance. In cool weather or when the exercise pace is gentle, the rate of sweat loss may be quite low. It is unnecessary and potentially dangerous to drink

at rates that are far greater than sweat losses. Over-hydration during exercise is called hyponatraemia (dilute levels of sodium in the bloodstream). Symptoms include headaches, disorientation, coma, and in severe cases, death. It is important to note though that this is relatively rare and dehydration is a much more common issue for athletes.

### ESTIMATING YOUR FLUID LOSS

Knowing your sweat rate can give you an indication of how much you should be drinking during exercise. Sports dietitians routinely measure an athlete's sweat rate during training and competition in a range of environmental conditions, to provide them with the information required to design an individual fluid plan. A simple strategy to work out your individual fluid loss is as follows:

- Weigh yourself in minimal clothing, as close to the start of exercise as possible. Ideally you should empty your bladder before weighing.
- Commence exercise session
- Weigh yourself at the end of your session, in minimal clothing again, ensuring you towel off any excess sweat from your body, pass urine and void your bowels if necessary.
- Your weight change during exercise reflects your total fluid loss; i.e. the difference between your sweat losses and fluid intake. Other minor losses come from breathing, spitting, vomiting and other insignificant sources.
- Repeat this procedure under different training conditions to get a good understanding of your individual fluid needs, for example in hot vs. cold temperatures, high intensity vs. low intensity sessions.
- Remember that weight loss during exercise is primarily water loss (not fat loss), and needs to be replaced soon after finishing exercise.

### HOW MUCH FLUID AND WHEN !

Drinking fluid during exercise helps to prevent a drop in performance caused by dehydration, and fluid after exercise will re-hydrate you. The amount of fluid and the timing of drinks depend on the individual and the sport.

Here are some tips:

- Always start exercise well hydrated; this will lower the risk of becoming dehydrated during sport. Urine colour can be indicative of hydration status.
- Aim for a pale yellow colour, as dark urine can represent a dehydrated state. There is minimal performance benefit to being over-hydrated as drinking excessive amounts of fluid before exercise causes increased urination and feeling bloated.

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### HOW MUCH FLUID AND WHEN (CONT'D)

- Develop a plan for drinking during exercise based on your own fluid losses and sweat rates.
- Immediately after exercise, monitor your weight change to estimate your final fluid deficit. During recovery, you will continue to lose fluids through sweating and urine losses, so plan to replace 125-150% of this fluid deficit over the next 2-6 hours. For example, if you lost 1 kg (1000mL), you will need to drink 1250-1500mL to fully re-hydrate. Drink fluids in conjunction with your recovery snacks and meal to achieve this goal.
- Different sports pose different challenges and opportunities for optimal hydration. For team and racquet sports there are formal breaks between play, with substitutions and time-outs, all offering an opportunity to drink. Some individual sports require you to drink on the move. Be smart and practice strategies to get maximum benefit from fluid intake with minimal fuss and discomfort. Try special squeeze bottles, or hands free drink pouches if practical.
- Thirst is not an effective indicator of hydration status while exercising. There is usually a significant fluid loss before you feel thirsty. When drinking, your thirst will be satisfied well before these losses have been fully replaced. Therefore, it is important to practice a fluid intake plan that is appropriate for you.

### WHAT IS THE BEST FLUID TO DRINK?

As there are many drink options available, you now need to think about which is best for you. Plain water alone is an effective drink for fluid replacement, especially in low intensity and short duration sports. However, if carbohydrate and electrolytes are added to water, as in a **sports drink**, performance can be enhanced, especially in high intensity and endurance sports. Carbohydrate provides an important energy source for muscles and the brain, as well as enhancing flavour. This can be one advantage of a sports drink over plain water; a flavoured drink is generally consumed in greater quantity than a non-flavoured drink.

Electrolytes such as sodium are lost in sweat and need to be replaced during and after prolonged exercise. Sodium in fluid improves fluid intake as it stimulates the thirst mechanism, promotes both carbohydrate and water uptake in the intestines, and reduces the volume of urine produced post-exercise. Sports drinks contain appropriate amounts of electrolytes for most sporting situations.

Of course, salt can be consumed in foods that are eaten at the same time as post-exercise fluids.

For more information, see the SDA fact sheet on Sports Drinks.

### caffeine

There are a growing number of drinks on the market that contain a number of ingredients including caffeine. Caffeine is no longer banned by the World Anti Doping Agency. The consumption of small to moderate doses of caffeine (75 - 200 mg) can help to sustain exercise performance, reduce the perception of effort, and is unlikely to alter hydration status during exercise in such doses. However, the use of caffeine amongst athletes is often ad hoc and they may be unaware of the potential detrimental side effects associated with its use. Ensure that you discuss the use of caffeine with your sports dietitian or sports scientist and consider individual responses to caffeine.

### alcohol

Alcohol is not a suitable fluid to choose immediately after exercise, as it impairs vital recovery processes, and may also impair the ability to rehydrate effectively post-exercise. If you choose to drink alcohol after exercise, look after your recovery needs first (i.e. replacing fluids, carbohydrate stores and consuming some protein to assist with muscle repair) and then consume alcohol in sensible amounts. However, if a soft-tissue injury is suspected, alcohol should be avoided as it can increase swelling and counter recovery goals.

### FLUIDS GUIDELINES SUMMARY

The detrimental effects of dehydration on performance may include:

- Loss of coordination, impaired ability to make a decision, increased rate of perceived exertion and increased risk of heat stress.
- Aim to match your sweat rate and fluid loss with fluid intake as closely as possible.
- Get to know your fluid loss by weighing yourself before and after training sessions and competition.
- Ensure that you drink at a rate that is comfortable.
- Practice your competition fluid intake plan in training sessions.
- Water is an excellent fluid for low intensity and short duration sports.
- Sports drinks are ideally suited to high intensity and endurance sports.
- Drink alcohol sensibly and assess the detrimental effects on your recovery.