

## Fluids and hydration

The effects of fluid loss and what type of fluid should you drink?

Fluid replacement during exercise and after exercise

Monitoring your hydration status

Sports drinks

Hypotonic / Isotonic / Hypertonic

This information is taken from 'Fuel for Performance, Nutrition for Sport', a sports nutrition resource updated and revised by the following Welsh sports dietitians:  
Rhian Owen, Chris Cashin, Elaine Hibbert-Jones and Gill Regan.  
Every acknowledgement is given to all the sports dietitians who contributed to the original publication of this resource, which was first published in 1998.

## Fluids and hydration

*“Dehydration impairs performance in most events, and athletes should be well hydrated before exercise.”*

International Olympic Committee (IOC) consensus statement on sports nutrition, 2003

### Why is fluid so important for athletes?

During all types of physical activity, heat is produced and lost from the body by the evaporation of sweat. The amount of fluid lost as sweat varies between individuals and is dependent on environmental conditions and duration of activity.

To prevent dehydration athletes should keep well hydrated at all times by drinking frequently before, during and after exercise.

### What factors affect your fluid requirements?

- Exercise duration and intensity - the longer and harder you train, the more fluid you will require.
- Environmental conditions – hot and humid conditions will increase fluid requirements.
- Hydration status - adequate hydration before exercise will reduce the risk of dehydration.
- Training status - endurance training helps the body maintain fluid balance.
- Bodyweight - in general, heavier athletes will require more fluid than lighter athletes.
- Genetic factors – certain individuals will sweat more than others and therefore need more fluid.
- Acclimatisation state – e.g. heat acclimatisation will increase sweat rate and encourage your body to start sweating sooner, which will increase your fluid requirements.
- Type of clothing/equipment worn - e.g. inappropriate clothing may prevent evaporation of sweat and could result in increased body temperature.

### Fluid – how much do you need?

- Sedentary individuals in the UK need to drink approximately 2 - 3 litres per day.
- Hard exercise may require 1 - 2 litres per hour, which is equivalent to 4 - 8 litres per day.
- Check that you are producing large quantities of clear urine. Dark urine is an indication of dehydration.

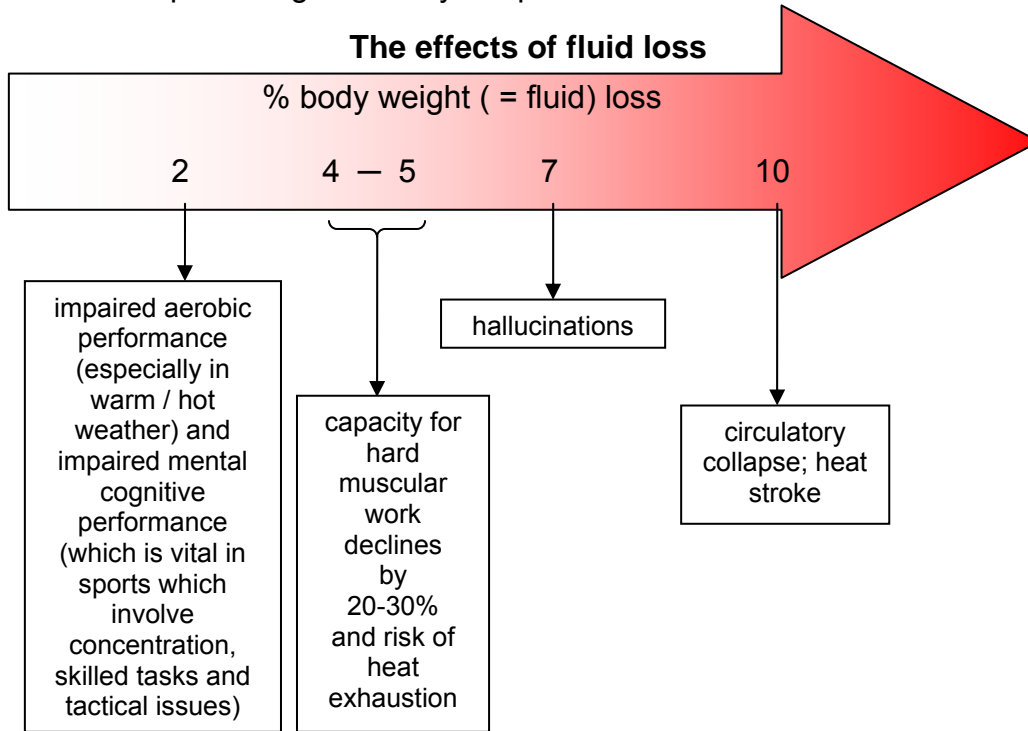
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## The effects of fluid loss

- Certain individuals will be better / worse at tolerating dehydration (ACSM, 2007) but in general, the greater the level of dehydration, the more your performance will be affected. Aerobic exercise performance can be impaired if you are dehydrated by as little as 2%. Dehydration of more than 2 - 3% of your body weight will make exercise seem harder. Severe dehydration can be fatal due to rapid changes in body temperature.



### What type of fluid should you drink?

- Your sports dietitian or registered sport and exercise nutritionist can help you determine the best fluid replacement strategy for your sporting event. In general,
  - water is a suitable fluid replacement if exercising at low intensity exercise for less than an hour.
  - Sports drinks with added electrolytes and carbohydrate may be beneficial in prolonged exercise (over 1 hour) in hot weather (Institute of Medicine, 1994)

Sports drinks can contribute to tooth decay. It is important to maintain good dental hygiene and take advice from your dentist if you are relying on them regularly.

### References

- American college of sports medicine (ACSM) (2007) Position stand on exercise and fluid replacement. *Medicine and science in sports and exercise*, 39, 377-390.
- Institute of medicine (1994) Fluid replacement and heat stress. Washington: The National Academies Press.

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## Fluid replacement...during exercise

- Drinking during exercise aims to provide:
  - Water and electrolytes to replace sweat loss.
  - Carbohydrate to supplement energy stores.
- Fluids needs are very individual, but in general, fluids should be consumed during exercise in events lasting longer than 60 minutes. Regular intake of fluids during prolonged exercise prevents dehydration and allows performance to be maintained.
- Drink during scheduled breaks between training, or ad hoc breaks in matches / competitions if rules allow.
- Guidance on how much fluid certain individuals should drink during a marathon in various environmental conditions is provided in the American College of Sports Medicine (ACSM) [Position Stand](#) (2007). However, other factors, such as the type of clothing worn may affect your fluid requirements.
- Weighing yourself immediately before and after training / competition is useful to see how much fluid you lose.  
**1 kg weight loss = 1 litre fluid lost during exercise and needs to be replaced immediately after exercise.**
- Practice drinking fluids during training and experiment with various drinks so that you know they are suitable for you to use in competition.
- Avoid fizzy (carbonated) drinks as they can cause gastric disturbances during exercise.

## Fluid replacement ...after exercise

- Start drinking immediately after exercise.
- Drink to plan rather than waiting until you're thirsty.
- Flavoured drinks may encourage greater fluid intake than plain water. Therefore, ensure the availability of palatable drinks.
- Drinks containing carbohydrate will be useful in restoration of muscle glycogen stores.
- Fluids containing alcohol and large amounts of caffeine (more than 180mg per day) are not ideal rehydration beverages because they may increase urine losses.
- Ask a sports dietitian or registered sport and exercise nutritionist to help you develop an individual rehydration plan – especially if you have a short recovery time before your next exercise session.

## References

- American College of Sports Medicine (2007) Position stand on exercise and fluid replacement. *Medicine and Science in Sports and Exercise*, 39, 377-390.
- Montain, S.J. and Coyle, E.F. (1993) Influence of the timing of fluid ingestion on temperature regulation during exercise. *Journal of Applied Physiology*, 75, 688-695.
- Shirreffs, S.M., Armstrong, L.E. and Cheuvront, S.N. (2004) Fluid and electrolyte needs for preparation and recovery from training and competition. *Journal of Sports Sciences*, 22, 57-63

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## Monitoring your hydration status

- ❑ Thirst is a poor indicator of the need for fluid. Drink before you are thirsty to ensure an adequate fluid intake.
- ❑ Check the colour of your urine. If it is darker than usual, it is likely you need to drink more fluid. Urine colour charts are available to help you determine if your urine is the right colour.
- ❑ Check how much urine you are producing. If you only produce a small amount of urine, it is likely you need to drink more fluid.
- ❑ As water is lost from your body, you lose weight. Weigh yourself before and after a training session, wearing as few clothes as possible to estimate your sweat loss.

1 kg weight loss = 1 litre of water lost during exercise

- ❑ This weight / fluid loss needs to be replaced immediately after exercise. Drink approximately 1.5 litres of fluid for every kg lost, e.g. if you lose 0.5 kg, drink an extra 750 ml of fluid at the next training session to keep this weight / sweat loss to a minimum (Shirreffs and Maughan, 1998).

N.B. Athletes should **not** drink so much that they **gain** weight during exercise.

- ❑ Your performance is likely to be impaired when you become dehydrated by as little as 2%

(hydration guides are available for purchase to help you calculate how much 2% weight loss is - contact [rhian.owen@sportsmail.com](mailto:rhian.owen@sportsmail.com) for more information)



## References

- American College of Sports Medicine (2007) Position stand on exercise and fluid replacement. *Medicine and Science in Sports and Exercise*, 39, 377-390.
- Shirreffs, S.M. and Maughan, R.J. (1998) Volume repletion after exercise-induced volume depletion in humans: replacement of water and sodium losses. *American J. Physiol.* 274; F868-F875.

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## Sports drinks

### What is a sports drink?

Manufacturers describe a sports drink as a non-alcoholic beverage, using 'science' to make claims about enhancing physical performance during sporting activity and speeding recovery.

Most sports drinks available aim to influence performance by providing the athlete with both a fluid and energy source from carbohydrate.

The formulations are usually classified as:

- Hypotonic
- Isotonic
- Hypertonic

Protein recovery drinks are also available but not always necessary. Any additional amino acids or protein required can easily be obtained from everyday foods.

*“Drinking carbohydrate-electrolyte beverages enhances performance compared with drinking the same level of water during prolonged (~45 - 50 mins) exercise or in high-intensity, intermittent exercise.”*

Casa, Clarkson & Roberts, 2005

### Reference

- Casa, D.J., Clarkson, P.M. & Roberts, W.O. (2005) [American College of Sports Medicine Roundtable on Hydration and Physical activity: consensus statements. Current Sports Medicine Reports](#) 4: 115-127.

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### **Hypotonic**

These drinks contain low levels of dissolved substances. They are formulated for fluid replacement rather than to provide energy. Most contain less than 3 grams carbohydrate per 100 ml i.e., less than 3%.

Examples: Lucozade Sport® Hydro Active (2g / 100ml)  
Powerade aqua +® (3g / 100ml)  
Sugar free/diet drinks e.g. diet Pepsi®, diet Irn Bru®, Sprite® Z  
are also hypotonic

These drinks can be taken before, during and after exercise.

### **Isotonic**

These are effective for fluid replacement and also provide some carbohydrate for the working muscles, i.e. they provide both fluid and fuel.

Most contain 5 - 7 grams carbohydrate per 100 ml i.e., 5 - 7%.

Examples: Gatorade Thirst Quencher® (6g / 100ml)  
High Five® Isotonic (7g / 100ml)  
Lucozade Sport® (6g per 100ml)  
Powerade® (6g / 100ml)  
Taut® (5g / 100ml)  
Many supermarkets have their own isotonic drinks e.g. Asda®  
isotonic sports drink, Tesco® Active Sport drink

These drinks can be taken before, during and after exercise.

Isotonic drinks can also be made up by yourself - for further information and recipes, contact a sports dietitian or registered sport and exercise nutritionist

### **Hypertonic**

These drinks contain a high concentration of dissolved substances. They are formulated to provide concentrated carbohydrate for refuelling of glycogen stores, rather than fluid for hydration.

Most contain greater than 10 grams carbohydrate per 100 ml i.e., 10%+.

Examples: EAS® Precision Carbs (20g / 100ml)  
Lucozade Energy® (17g / 100ml)  
Many ordinary fizzy drinks (not diet varieties) are also  
hypertonic e.g. Coca Cola®, Tango®

These drinks should not be taken during exercise.

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