



AIS WEBSITE FACT SHEET – AIS SPORTS SUPPLEMENT PROGRAM

Sports drinks (carbohydrate-electrolyte drinks)

Supplement Overview

- Designed to deliver a balanced amount of carbohydrate and fluid to allow an athlete to simultaneously rehydrate and refuel during exercise. According to various expert position stands, to provide rapid delivery of fluid and fuel and to maximise gastric tolerance and palatability, sports drinks should be within a compositional range of 4-8% (4-8 g/100 ml) carbohydrate and 23-69 mg/100mL (10-30 mmol/L) sodium (American College of Sports Medicine et al. 2007; American Dietetic Association et al. 2009)
- For situations which require a high rate of delivery to the muscle of newly ingested carbohydrates, drinks containing “multiple transportable carbohydrates” - a blend of carbohydrates such as glucose and fructose which use different intestinal transporters - may overcome the usual limitation of gut uptake of carbohydrate. Studies show that such mixtures are effective in increasing muscle oxidation of carbohydrate consumed during exercise compared with glucose-based products (see Jeukendrup, 2010).
- Replacement of electrolytes, particularly sodium, is useful for maintaining the thirst drive. Sodium concentrations of ~ 10-25 mmol/L enhance the palatability and voluntary consumption of fluids consumed during exercise.
- Sodium concentrations higher than those typically provided in commercial sports drinks are needed to restore fluid balance and reduce urine losses during the reversal of moderate-severe dehydration. They may also be needed to replace sweat sodium losses during exercise in situations of high losses (e.g. salty sweaters, prolonged exercise). Dedicated electrolyte supplements suited to the replacement of large electrolyte losses and commercial sports drinks with higher sodium concentrations are discussed in the [Electrolyte Replacement Supplements](#) fact sheet.
- Other electrolytes (e.g. magnesium, potassium and calcium) may be included in sports drinks. Current evidence indicates that significant quantities of magnesium are not lost during exercise (Armstrong et al 2007) so it is unlikely that additional magnesium will enhance hydration goals or reduce cramping.
- Protein or amino acids (2% or 2 g/100 ml) can be found in a small number of commercially available sports drinks. Some studies show that sports drinks providing protein/amino acids are superior to carbohydrate-electrolyte drinks in enhancing performance or recovery in specific exercise situations (e.g. prolonged exercise). The case for consuming protein during **recovery after exercise** is strong and can be achieved by a range of sports products and everyday foods other than sports drinks. The benefits of consuming protein **during exercise** on **performance** of exercise are contentious. A recent meta-analysis of the literature (11 studies) suggested a methodological bias exists with the results of studies; benefits are seen with time to exhaustion protocols and when protein provides additional energy to sub-optimal intakes of carbohydrate. It was concluded that any ergogenic benefits may result from a generic effect of additional energy intake rather than a unique benefit of protein (Stearns et al. 2010). Further research is warranted but should also consider the effects of amino acids/protein on the flavour profile of a drink.



- The taste and temperature of sports drinks are also important factors in meeting hydration goals. Studies show that athletes more closely match fluid intake to sweat losses when offered flavoured sports drinks compared to water (Minehan et al. 2002, Maughan et al. 1993). Cool fluids are generally more palatable for athletes who are exercising in hot conditions or have become hot though the heat gain associated with high-intensity exercise.
- Enhanced immune function has been demonstrated when carbohydrate is replaced during prolonged exercise (Gleeson 2004).

Products and protocols

- Commercially available in ready to drink and powdered forms in a wide range of flavours which vary according to their carbohydrate (CHO) and electrolyte content as well as the addition of other ingredients

Table 1. Commonly available commercial sports drinks

Sports drink	CHO g/100 ml	Sodium		Other comments
		mmol/L	mg/100 ml	
Available in Australia				
Gatorade	6	22	51	
Gatorade Endurance	6	38	87	Higher in electrolytes than standard Gatorade
Powerade Isotonic	7.6	12	28	
Staminade	7.5	13	29	
High 5 isotonic	7.7	35	80	Contains "supercarbs" (multiple transportable carbohydrate mixture)
Endura magnesium rehydration	6.4	8	18	Contains magnesium (160 mg per 350 ml dose)
Sukkie	5	23	50	Dental protection due to higher pH (5.0) and added calcium
SiS Go Electrolyte Sports Fuel	7.4	20	46	
Musashi Electrolyte Replacement	4.9	19	43	Contains very small amounts glutamine and Branched chain amino acid (~ 2 g/L)
Gu Electrolyte Brew				Contains multiple transportable carbohydrates
Body Science Fuel Series Sports drinks	6	16	36	
Body Science Fuel Series Advanced Sports drink	5.2	29	67	Contains very small amounts of Branched chain amino acid (~ 2 g/L)
Torq	6	24	55	Flavoured varieties contain multiple transportable carbohydrates. Also in natural (maltodextrin) flavour
International brands				
PowerBar Isoactive (Europe)	5.8	36	84	Contains "C2max" (multiple transportable carbohydrates). Higher in electrolytes than most sports drinks
PowerBar Isomax (Europe) - 50 g per 500 ml - 50 g per 750 ml	8.2 6.6	34 22	80 53	Contains "C2max" Also contains protein (4-6 g/L) and 70 mg caffeine per sachet
PowerBar Perform (USA)	7	34	79	Contains "C2max". Higher in electrolytes than most sports drinks
Powerade GB Ion4 (UK)	~ 4	~ 20	46	
Powerade Pro	~ 4	~40	92	Higher in electrolytes than Powerade Isotonic or ion 4
Lucozade Sport Body Fuel	6.4	22	51	
Isostar	7	30	68	
Accelerade	6	21	48	Added whey protein (15 g/L)



Situations for Use in Sport

- Sports drinks provide a convenient option for simultaneously addressing fuel, fluid and electrolyte needs before, during and after exercise.
- **Use before exercise:** may be part of the pre-exercise meal or consumed immediately before exercise to top up fluid and fuel status
- **Use after exercise:** may be part of post-exercise recovery snacks and meals to assist with rehydration. Can also contribute to refueling goals but other foods/sports products should be considered to address total recovery needs
- **Use during exercise:** major role for sports drinks to promote hydration and refueling during exercise.
 - **Hydration:** promotes voluntary drinking and fluid retention to assist the athlete to achieve a fluid intake plan that keeps the fluid deficit incurred during exercise to an acceptable level
 - **Fuelling:** provides easily consumed carbohydrates to allow the athlete to meet fuel targets for their sporting activities (see table 2)
- Note that the composition of sports drinks provides a generic balance between fluid and carbohydrate needs across a range of sports. The relationship between fluid and fuel needs may vary according to the environment, the athlete’s nutritional preparation and the demands of the exercise.
 - If fluid needs > carbohydrate needs: sports drinks with lower carbohydrate content or diluted sports drinks may be used
 - If carbohydrate needs > fluid needs: sports drinks with higher carbohydrate content may be used or supplemented with [sports gel/](#) [sports bar/](#) [sports confectionery](#)

Type of sport/exercise	Duration	Carbohydrate target	Comments
Brief exercise	< 45 min	Not needed	
Sustained high-intensity exercise	45-75 min	Small amounts including mouth rinse	<ul style="list-style-type: none"> • A range of drinks and sports products can provide easily consumed carbohydrate
Endurance exercise including “stop and start” sports	1-2.5 h	30-60 g/h	<ul style="list-style-type: none"> • Opportunities to consume foods and drinks vary according to the rules and nature of each sport. • A range of everyday dietary choices and specialised sports products ranging in form from liquid to solid may be useful • The athlete should practice to find a refuelling plan that suits their individual goals including hydration needs and gut comfort
Ultra-endurance events	>2.5 -3 h	Up to 90 g/h	<ul style="list-style-type: none"> • As above • Higher intakes of carbohydrate are associated with better performance. • Products providing multiple transportable carbohydrates (glucose:fructose mixtures) will achieve high rates of oxidation of carbohydrate consumed during exercise

Table 2. Guidelines for carbohydrate intake during sporting activities (taken from Burke et al. 2010)



Concerns Associated with Supplement Use

- Athletes need to consider their physique goals when deciding whether to consume sports drinks. For athletes on a restricted energy budget or those trying to achieve a lean physique, overuse of energy-dense fluids such as sports drinks may create problems with energy balance and overall nutrient density of the diet.
- Sports drinks should be mixed according to the manufacturer's directions (or as advised by a Sports Dietitian) to ensure that fluid and carbohydrate intake goals are met and gastrointestinal tolerance is optimised.
- Some athletes report that sports drinks cause gut discomfort or make them feel unwell. While some athletes may not tolerate sports drinks well, the following strategies can help to minimise problems
 - Dehydration increases the risk of gastrointestinal problems during exercise and is often the cause of such complaints. Practicing fluid intake strategies during training can assist in preventing dehydration as well as helping to overcome problems such as dislike of the taste, mouth-feel of the drink and gastrointestinal discomfort.
 - The use of sports drinks with multiple transportable carbohydrates may assist in maximising gastrointestinal comfort.
 - Training with carbohydrate intake increases gut absorption of carbohydrates and may reduce discomfort
- Sports drinks, like other carbohydrate containing fluids, including soft drinks and fruit juices, have been shown to contribute to dental erosion. To help reduce the potential impact of sports drinks on dental health, athletes should:
 - Minimise the contact time the sports drink has with their teeth. Do not hold or swish sports drinks in your mouth. A straw or squeeze bottle can also minimise contact time with the teeth by directing fluids towards the back of the mouth.
 - Where practical, consume dairy products or chew sugar free gum immediately after consumption of the sports drink.
 - Avoid brushing teeth for at least 30 minutes after consuming sports drink to allow tooth enamel to re-harden.
- Individuals with fructose malabsorption or FODMAP intolerance should be aware of the fructose content of sports gels containing multiple transportable carbohydrates

Further reading

American College of Sports Medicine, Sawka MN, Burke LM, Eichner ER, Maughan RJ, Montain SJ, Stachenfeld NS. American College of Sports Medicine position stand. Exercise and fluid replacement. *Med Sci Sports Exerc.* 2007; 39(2):377-90.

American Dietetic Association, Dietitians of Canada, American College of Sports Medicine, Rodriguez NR, Di Marco NM and Langley S. American College of Sports Medicine position stand: Nutrition and athletic performance. *Med Sci Sports Exerc* 2009; 41(3):709-731.

Armstrong L, Casa D, Millard-Stafford M, Moran D, Pyne S and Roberts W. American College of Sports Medicine position stand: Exertional heat illness during training and competition. *Med Sci Sports Exerc* 2007; 39(3):556-572.



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Burke LM, Hawley JA, Wong SH, Jeukendrup AE. Carbohydrates for training and competition. *J Sports Sci*. 2011 Jun 8:1-11. [Epub ahead of print]

Gleeson M, Nieman DC and Pedersen BK. Exercise, nutrition and immune function. *J Sports Sci* 2004; 22: 115-125

Jeukendrup AE. Carbohydrate and exercise performance: the role of multiple transportable carbohydrates. *Curr Opin Clin Nutr Metab Care* 2010; 13(4): 452-457.

Maughan RJ and Leiper JB. Post-exercise rehydration in man: effects of voluntary intake of four different beverages. *Med Sci Sports Exerc* 1993; 25:34-35.

Minehan MR, Riley MD and Burke LM. Effect of flavor and awareness of kilojoule content of drinks on preference and fluid balance in team sports. *Int J Sport Nutr Exerc Metab* 2002; 12(1): 81-92.

Stearns RL, Emmanuel H, Volek JS, Casa DJ. Effects of ingesting protein in combination with carbohydrate during exercise on endurance performance: a systematic review with meta-analysis. *J Strength Cond Res*. 2010; 24(8):2192-202.

Last updated November 2011

This Fact Sheet was prepared by AIS Sports Nutrition as part of the AIS Sports Supplement Program (www.ausport.gov.au/ais/nutrition/supplements). Note that a Fact Sheet with additional information on this topic is available for Members of the AIS Sports Supplement Program at this site.

The AIS Sports Supplement Program has been designed for the specific needs of AIS athletes and all attempts are made to stay abreast of scientific knowledge and of WADA issues related to anti-doping. It is recommended that other athletes and groups should seek independent advice before using any supplement, and that all athletes consult the WADA List of Prohibited Substances and Methods before making decisions about the use of supplement products. © Australian Sports Commission 2012