



AIS SPORTS SUPPLEMENT FRAMEWORK

SPORTS BARS

What is it?

- > Sports or energy bars provide a compact and portable source of carbohydrate that can be easily consumed before or during exercise to contribute to carbohydrate intake targets.
- > Carbohydrates consumed during exercise can support or enhance performance via two different mechanisms: provision of fuel to the muscle and a mouth sensing benefit to the brain and central nervous system. Guidelines for carbohydrate intake during different sporting activities vary according to the importance of these effects.
- > There may be other roles for carbohydrate intake during prolonged strenuous exercise that are of benefit to athlete health, particularly for high performance athletes. These roles are based on studies that investigate the acute response to exercise; further work is needed to determine if these actions translate into a reduced risk of illness and injury.
 - Consuming carbohydrate before, during and/or after prolonged intensive exercise may help to protect immune function by being associated with a reduction in the detrimental changes in cytokines and immune system cells normally induced by exercise stress.¹
 - Such intake may also be beneficial to bone health by reducing the effect of exercise with low carbohydrate availability on markers of bone resorption.²
- > Although many athletes focus on liquid forms of carbohydrate during exercise (e.g. sports drinks or more concentrated gels) to address fluid replacement as well as fuel needs, studies show that solid forms of carbohydrate can also be well tolerated and are able to supply a rapid fuel source to the muscle³. Sports/energy bars offer the advantage of being a more compact and convenient fuel source for scenarios in which the athlete needs to transport their own nutritional support.

What does it look like?

- > Sports/energy bars typically focus on providing carbohydrate around exercise sessions and have two presentation forms with different characteristics around nutrient content and gut tolerance during exercise:
 - Chewy, low fibre, blended products (e.g. "powerbar"). These bars are typically used as a carbohydrate source for higher intensity endurance and ultra-endurance events/workouts where a low fibre content may assist with gut tolerance.
 - "Granola bar" like products with recognisable food ingredients (e.g. "Clif bar"). These are more suited to longer events of lower intensity where the increased fibre content can be better tolerated and flavour fatigue creates a need for a greater range of taste and texture choices.

Note: bars with a more diverse nutrient composition, including a higher protein content, are covered in a separate fact sheet on mixed macronutrient products.

How and when do I use it?

- > **Use pre-exercise:** provides a low fibre carbohydrate source to assist the pre-event fuelling goals of athletes who are unable to tolerate regular foods and fluids.
- > **Use during exercise:** can supply carbohydrate to the muscle and central nervous system.
- > **Use post-exercise:** can contribute to post-exercise refuelling. Note that other foods/sports products should also be considered in post-exercise meals/snacks to address total recovery needs.
- > **Travel:** Provides a compact and convenient option while travelling either locally or internationally for training or competition, with the extended shelf-life and portability making access to trialled and familiar fuelling options easier.

Sports bar ingestion during exercise provides an additional fuel source for the muscle according to the requirements of each sporting activity. Performance benefits have been clearly demonstrated in a range of sporting events as a result of this strategy^{4,5}. Furthermore, exposure of receptors in the mouth/oral cavity to carbohydrate creates a favourable response in the brain and central nervous system (CNS), decreasing the perception of effort and pacing strategies⁶. Delivery of carbohydrate consumed during exercise to the muscle is largely influenced by the rate at which it can be absorbed by the small intestine. Typically, ingesting glucose-based carbohydrates (e.g. sucrose, glucose polymers, maltodextrin) at rates in excess of ~ 60 g/h during exercise does not lead to additional performance benefits. In fact, because intestinal glucose transporters (called SGLT1) are saturated at this level, excessive carbohydrate intake can cause gut discomfort/problems that impair performance. See Table 1 for guidance on carbohydrate ingestion rates during exercise.



- The gut can be 'trained' by consuming carbohydrates during exercise to maximise the number and activity of the SGLT1 transporters, thus enhancing glucose uptake and reducing gut symptoms.^{7,8}
- In addition, some newer sports foods contain 'multiple transportable carbohydrates' - a blend of carbohydrates such as glucose and fructose which are absorbed via different transporter molecules in the intestine to overcome the usual bottleneck of a single transport system.
- Studies have shown that when carbohydrates are consumed at high rates (> 60 g/h) during exercise to meet new guidelines for prolonged strenuous events, sports foods containing multiple transportable carbohydrates are more effective than glucose-based products in maintaining gut comfort, promoting muscle carbohydrate oxidation and enhancing performance.⁹

Table 1: Guidelines for carbohydrate intake during sporting activities¹⁰

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 (swilling in mouth)	<ul style="list-style-type: none"> > A range of drinks, gels and sports products can provide easily consumed carbohydrate. > The main benefit from carbohydrate use in these events comes from interaction with the brain and CNS. To achieve optimal benefit, the athlete may need to organise their event nutrition strategy to allow frequent "mouth sensing" with a significant duration of mouth contact [e.g. 10 s].
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 from liquid to solid may be useful. > The athlete should practice a fuelling plan to find one that suits individual goals including hydration needs and gut comfort. > The benefits of carbohydrate intake strategies in these events are likely to be achieved both in the muscle (fuel) and CNS (perception of effort).
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 carbohydrate absorption and oxidation during exercise. > The benefits of carbohydrate intake in these events are likely to be achieved both in the muscle (fuel) and CNS (perception of effort).

Are there any concerns or considerations?

Unnecessary expense

Sports bars are not needed at every training session and may be an unnecessary expense.

Excess energy intake

Athletes need to consider their physique goals and total nutritional goals when deciding whether to consume sports/energy bars. In the case of athletes who have short- or long-term restrictions on dietary energy intake, overuse of energy-dense sports foods such as sports bars may create problems with energy balance and the overall nutrient density of the diet.

Gut discomfort

- > Athletes should practice their use of bars pre- and during training sessions to assess tolerance if they are intended for use during competition. Some athletes experience significant gastrointestinal issues and may need an individualised protocol. The following strategies can help to minimise problems:
 - Consume sports bars with adequate fluid to meet hydration needs and to improve gastrointestinal tolerance.
 - 'Gut training' – deliberately consuming a gradually increasing amount of carbohydrate via products such as sports bars during workouts can allow the gut to develop better capacity to absorb carbohydrate and improve comfort.

- The use of sports bars with multiple transportable carbohydrates may assist in maximising gastrointestinal comfort, particularly when carbohydrate is consumed at high rates of intake (> 60 g/h).
- > Individuals with fructose malabsorption or FODMAP intolerance should be aware of the fructose content or additions of ingredients like inulin in sports bars containing multiple transportable carbohydrates.

Dental erosion

- > Sports/energy bars, like other sticky carbohydrate-containing foods are likely to contribute to dental erosion. To help reduce the potential impact of sports bars on dental health, athletes should consider the following options when they are realistic within the sports nutrition plan.
 - Minimise the length of exposure between the teeth and the sports bar, and drink water after consuming a sports bar to rinse the mouth out.
 - Where practical, consume dairy products immediately after exercise or chew sugar free gum immediately after consumption of the sports bar.
 - Avoid brushing teeth for at least 30 minutes after consuming a sports bar to allow tooth enamel to re-harden.¹¹

Interference with opportunities for training adaptation

The optimal training program may include the periodisation of workouts in which there is "low carbohydrate availability" (i.e. the session is undertaken with low muscle glycogen stores and/or after an overnight fast). This strategy may increase some of the important adaptive responses to exercise. Therefore, on some occasions, an athlete may deliberately choose not to consume carbohydrate during the session or during the first part of a session.¹²

Where can I find more information?

Sports Dietitians Australia

www.sportsdietitians.com.au/factsheets

Supplement safety information

www.sportintegrity.gov.au/what-we-do/anti-doping/supplements-sport

References

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The Australian Institute of Sport (AIS) Supplement Framework is an initiative of the Australian High Performance Sport System. The AIS acknowledges the support of members of the National Institute Network (NIN) and National Sporting Organisations (NSO) and their staff in delivering content expertise. This information is intended to help athletes, coaches and scientists make evidence-based decisions about the use of supplements and sports foods. Before engaging in supplement use, we recommend that each individual refer to the specific supplement policies of their sporting organisation, sports institute or parent body, and seek appropriate professional advice from an accredited sports dietitian (www.sportsdietitians.com.au).

Athletes should be aware that the use of supplements may have doping implications. Athletes are reminded that they are responsible for all substances that enter their body under the 'strict liability' rules of the World Anti-Doping Code. Some supplements are riskier than others. The Sport Integrity Australia (SIA) app is a useful resource to help mitigate the risk of inadvertent doping by helping to identify supplements that have been batch-tested. The SIA App provides a list of more than 11,000 batch-tested products. We recommend that all athletes consult the educational resources of SIA regarding the risks associated with supplements and sports foods. While batch-tested products have the lowest risk of a product containing prohibited substances, they cannot offer you a guarantee that they are not contaminated (www.sportintegrity.gov.au/what-we-do/supplements-sport).

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