AIS SPORTS SUPPLEMENT FRAMEWORK
SPORTS CONFECTIONERY

What is it?

Sports confectionery, often called "sports chews" provide a highly concentrated source of carbohydrate in a chewy jelly bean/jube form that is easily consumed and quickly digested. These products provide an alternative or additional source of carbohydrate to consume during exercise. They are typically provided in packets or pouches that are particularly suited for situations where consumption of smaller serves of carbohydrate can be managed at frequent intervals.

Carbohydrates consumed during exercise can support or enhance performance via two different mechanisms: provision of fuel for 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 support 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]

What does it look like?

New products are appearing in this range to boost the variants of flavour, size and consistency of individual pieces, and the addition of other "active ingredients" or forms of carbohydrate. Note, however that many products are similar to everyday jelly confectionery. Typical carbohydrate content ranges from 75–90% by weight (75–90 g/100 g) or 4-6 g per piece.

> Typical sodium content ranges from 150-300mg / 100g, although certain varieties are very low

> Some varieties contain other active ingredients such as caffeine

> Some varieties of sports confectionery contain "multiple transportable carbohydrates" — a blend of carbohydrates such as glucose and fructose which are absorbed from the intestine via different transporter molecules (see below)

Sports confectionery should be consumed with water or other dilute fluids, which can separately address hydration needs for the activity. This fluid intake will also reduce the net carbohydrate concentration to reduce the risk of gut upsets.

It is noted that early sports nutrition guidelines warned against consuming concentrated forms of carbohydrate during exercise. However, recent studies have shown that sports gels consumed with water during moderate intensity exercise are well tolerated and provide a similar pattern of carbohydrate delivery and oxidation by the muscle to sports drinks. This is likely to be the case for sports confectionery (see Sports Gel fact sheet).

How and when do I use it?

Sports confectionery are suitable for use in the same situations as sports gels, but offer more flexibility with timing of intake since individual pieces can be consumed at more frequent intervals.

> **Use pre-exercise:** sports confectionery provide a low fibre and compact carbohydrate source for pre-event fuelling for athletes who are unable to tolerate regular foods and fluids

> **Use during exercise:** to supply carbohydrate to the muscle and central nervous system

> **Use post-exercise:** Can contribute to refuelling goals but other foods/sports products should be considered to provide a more nutrient-dense approach to total recovery needs.

> Fuelling: supplies easily consumed carbohydrates to provide 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.[3,4] See Table 1 for recommendations.

> Mouth sensing: the 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 strategies.[5,6]

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Table 1: Guidelines for carbohydrate intake during sporting activities[7]

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)	> 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	> 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 to find a fuelling plan 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	> 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).

Exercise delivery of carbohydrate consumed during exercise to the muscle is largely influenced by the rate at which it can be absorbed in 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.

> The gut can be 'trained' by consuming carbohydrates during exercise to maximise the number and activity of the SCGT1 transporters, thus enhancing glucose uptake and reducing gut symptoms.[8,9]

> 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 on 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.[10]

Are there any concerns or considerations?

Unnecessary expense

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

Unnecessary energy intake

Athletes should consider their physique goals and total nutritional goals when deciding whether to consume sports confectionery around exercise. 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 confectionery may create problems with energy balance and overall nutrient density of the diet.

Sports confectionery should be used for the specific conditions for which they are intended rather than as a general snack. Sports confectionery is an expensive alternative to general jelly confectionery ("lollies"), or to regular food and fluid choices. This may be warranted if there is a benefit associated with a specific size or consistency of the confectionery or the presence of other "active ingredients" (e.g. caffeine, electrolytes).

Dental erosion

Repeated exposure of the teeth to sticky forms of carbohydrate is not ideal for dental health. To help reduce the potential impact of sports confectionery on dental health, athletes should consider the follow options when they are practical or able to be balanced with the sports nutrition plan.

> Minimise the contact time between the sports confectionery and the teeth, and rinse the mouth with water after finishing the confectionery.

> Where practical, consume dairy products after the session or chew sugar-free gum immediately after consumption of the sports confectionery.

> Avoid brushing teeth for at least 30 minutes after consuming sports confectionery to allow tooth enamel to re-harden.

Gut discomfort

Although most athletes tolerate sports confectionery well, it is likely that a small number of athletes will suffer from significant gastrointestinal issues and may need an individualised protocol. Sports confectionery should be consumed with adequate fluid to meet hydration needs and to improve gastrointestinal tolerance. The following strategies can help to minimise problems.

> Sports confectionery should be consumed with adequate fluid to meet hydration needs and to improve gastrointestinal tolerance.

> 'Gut training' – deliberately consuming a gradually increasing amount and concentration of carbohydrate during workouts - can allow the gut to develop better capacity to absorb carbohydrate and feel comfortable.

> The use of sports confectionery 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 of sports confectionery containing multiple transportable carbohydrates.

Interference with opportunities for training adaptation

Some athletes may periodise their carbohydrate intake to help support training adaptations. This may include the prescription 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 first part of a session.[11,12]

Where can I find more information?

Sports Dietitians Australia

www.sportsdietitians.com.au/factsheets

Supplement safety information

www.asada.gov.au/substances/supplements-sport

References

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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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