

Nutrition Fuel for performance

Sports Gels - A compact energy boost!

Written By Greg Cox - Sports Dietitian

Dare I mention this in a running mag, but my background is triathlon – don't flick the page just yet, there is a reason for stating this. What has always intrigued me about runners, as a triathlete, is that they are so rudimentary in their training and competition nutrition practices. This is coming from an athlete involved in a sport where gadgets are important and fluorescent green was once seen as 'cool'. In consulting to numerous runners over the years, this is what I have learnt:

Runners don't

- Drink much during training or competition
- Rarely, if at all, use a sports drink in training.
- Would have rarely used a carbohydrate gel, well maybe if they got a free one in a race bag

Runners do

- Carbohydrate load aggressively before racing. Steve Monghetti was famous for employing the depletion method of carbohydrate loading prior to running a marathon.
- Drink water in training when available, but would never be seen dead wearing a drink bottle belt.
- Wear really old race singlets when training!!

These maybe generalisations, but I suspect you get the idea. So how important is carbohydrate while running? How much or should I say how little carbohydrate should you consume in order to improve or maximise your running performance in training and competition? And lastly, where do carbohydrate gels fit into the picture? All these questions and more will be answered in this article.

Carbohydrate during exercise

You can look at this issue two ways: How much carbohydrate do I need to consume during exercise to improve exercise performance? Or an alternative approach - How little carbohydrate do I have to consume during exercise to improve exercise performance? Which question you ask depends on the

type of event you are about to complete. In longer races where you will stress your muscle and liver glycogen stores you need to take the first approach – How much carbohydrate do I need to consume? However, in shorter exercise situations where muscle carbohydrate depletion and hypoglycaemia (low blood sugar levels) are unlikely to occur, you could take the alternative approach - How little carbohydrate should I consume?

Long Distance Races – Marathon and Beyond

Hypoglycaemia was one of the earliest medical problems identified in marathon

runners suffering from fatigue and collapsing at the end of a race. Researchers obtained blood samples from runners at the end of the 1923 Boston marathon race and observed that 3 of the 12 runners studied finished the race in a very poor condition: these individuals had a blood glucose concentration of less than 2.8 mmol/l – normal blood glucose is 4-8mmol/l. The following year, researchers were able to prevent the onset of hypoglycaemic symptoms by feeding carbohydrate during the race and found that performance was improved when carbohydrate was consumed by the runners.

For distances of marathon and beyond, energy replacement is necessary for optimum performance.



Brett Cartwright. Photo by Viktah Sailer.



The central nervous system relies solely on glucose as a fuel unlike muscle, which uses a mix of glucose and fat as fuel during exercise and rest. As a consequence, if blood glucose levels fall below normal levels, the rate of uptake by the brain may not be sufficient to meet its metabolic needs. This will result in hypoglycaemia, which has a variety of symptoms including dizziness, nausea and disorientation. Depletion of muscle carbohydrate stores can happen independently to a drop in blood sugar levels, however it's likely the two occur at similar time points during exercise. Runners often describe this feeling as 'hitting the wall' which usually occurs somewhere between 35-38km during a marathon.

The American College of Sports Medicine suggest that for exercise lasting longer than one hour, athletes aim to consume 30-60g of carbohydrate each hour. This carbohydrate should be consumed with an adequate amount of fluid in order to replace all fluid loss from sweating or as recommended 'the maximal amount tolerated by the individual'. In order to achieve the recommended amount of carbohydrate an athlete would need to consume 500-1000ml of a 6% carbohydrate sports drink each hour (e.g. Gatorade). For many runners large volumes of fluid are often difficult to consume, particularly for athletes running quickly. The use of sports gels however (typically containing 17-30g of carbohydrate per

serve) in combination with smaller volumes of fluid would allow a runner to meet the suggested carbohydrate guidelines, and presumably obtain the benefits associated with consuming carbohydrate during endurance events.

1/2 Marathon or shorter

In shorter events such as 10km fun runs and half marathon races, assuming suitable pre-exercise strategies have been undertaken to ensure adequate liver and muscle glycogen stores, blood glucose levels are usually maintained or even slightly elevated by exercise. So there is no or little chance of 'hitting the wall' during a high-intensity race such as a 10km fun run. So why bother consuming carbohydrate in high-intensity racing when there is sufficient fuel stored in the liver and muscle to maintain blood sugar levels and provide fuel for the working muscles? This is why - A series of studies has been completed by Asker Jeukendrup and colleagues investigating the possible benefits of carbohydrate during one hour of high intensity exercise. In their initial study, researchers compared a sports drink containing 7.6% carbohydrate with a flavoured matched placebo containing no carbohydrate. Researchers found that when athletes consumed the sports drink, one hour cycling time trial performance was improved by 2.3%. In a follow-up study, using a very similar protocol researchers found that intravenous glucose delivery failed to alter performance despite

increased blood glucose levels. In light of the findings from the second study, researchers had subjects complete the same exercise protocol and had subjects rinse their mouth with either a 6.4% carbohydrate drink every 12.5% of the time trial or an equivalent amount of water. Subjects were instructed not to drink either the carbohydrate drink or water. In a fascinating conclusion to this series of studies, researchers found that rinsing your mouth with a carbohydrate drink increased power output and achieved a 3% faster performance time. The researchers speculated that carbohydrate consumed stimulates receptors and nerve endings in the mouth and gastrointestinal tract that directly triggers areas of the brain associated with motivation or pacing, allowing cyclists to complete the time trial at a higher work output but with a similar sense of pacing and perceived effort. So, despite the difficulties of consuming sports drinks or gels during high intensity running, it maybe worth trying to consume a small amount regularly in these types of events.

Sports Gels - Summary:

Sports gels (or liquid lollies) are substantially more concentrated in carbohydrate than sports drinks. They offer a convenient, concentrated fuel boost in a single serve that can be easily consumed during exercise. Sports gels are best used in situations where you need to meet suggested carbohydrate intakes of 30-60grams an hour. For most athletes competing in marathon or longer events, sports gels will assist you in meeting hourly carbohydrate needs. Some caution should be taken if you are considering using sports gels during competition as they may cause gastrointestinal upset. Take advice from the great Gebrselassie and try your race nutrition strategies in training. Keep in mind that sports gels should be consumed with adequate fluid to meet hourly fluid needs. Sports gels come in a variety of flavours and consistencies. You should try different gels to see what suits your personal likes and dislikes. Some gels can be added to water (in a gel flask) to make them less vicious, which may make the gel a better consistency for consuming. Only problem with that is you would need to wear a gel flask belt – which means someone may mistake you as a triathlete!!

Further Suggested Reading

American College of Sports Medicine. Position stand: exercise and fluid replacement. *Med Sci Sports Exerc* 1996; 28: i-vii.

Burke LM, Wood C, Pyne DB, Telford RD, Saunders P. Effect of carbohydrate intake on half-marathon performance of well-trained runners

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Gordon B, Cohn LA, Levine SA, Matton M, Scriver WDM, Whiting WB. Sugar content of the blood in runners following a marathon race. *JAMA* 1925; 185: 508-509

Jeukendrup A, Brouns F, Wagenmakers AJM, Saris WHM. Carbohydrate-electrolyte feedings improve 1 h time trial performance. *Int J Sports Med* 1997; 18: 125-129.

Levine SA, Gordon B, Derick CL. Some changes in the chemical constituents of the blood following a marathon race. *JAMA* 1924; 82: 1778-1779.

Learning from London mistakes

Gebrselassie believes that Amsterdam will be an important learning curve in his marathon career. "Three years ago in London, I took only water throughout the race and at the end, I felt really cold and tired," says Gebrselassie, who says he will be using sports drinks throughout his race in Amsterdam. "They are better than plain water. The glucose is very important." He added that he has already tried the drinks in training. "It proved successful," he said. "I will pick them up at drinks stations during the race because they are vital for keeping my energy levels constant."

News snippet on the IAAF website (www.iaaf.org)



RECENT FINDINGS

Recently, researchers at the Australian Institute of Sport investigated the possible effect of consuming a sports gel during a half marathon in 18 highly trained runners². Runners consumed either a placebo (non-carbohydrate containing) drink or a carbohydrate gel providing 1.1 grams of carbohydrate per kilogram body mass (roughly 70grams or 2? x Powergels). Three runners complained of gastrointestinal discomfort in the gel trial, which produced a clear impairment of their half-marathon performance; increasing time by 2.4% or 105 sec. The effect of the carbohydrate gel on performance time for the entire group was trivial: half marathon time was improved by 0.3% or 14 s compared with placebo trial.

Consuming the gel was associated with a 2.4% slower time through the 2 x 200 m feed zone; only adding a trivial - 2 sec to half-marathon time. Interestingly, the majority of runners in the study stated that they would consume gels in future distance running races despite the absence of a clear enhancement of running performance. This position represents a major change to their habitual race nutrition strategies that normally involve the intake of small volumes of fluid and no (half marathon) or little (marathon) intake of carbohydrate.

Mexican Chicken Lasagne

- Spray canola or olive oil
- 400 g lean minced chicken
- 1 red capsicum, finely chopped
- 1 teaspoon finely chopped red chilli
- 440 g can red kidney beans, rinsed and drained
- 575 g jar tomato-based pasta sauce
- 400 g can crushed tomatoes
- 375 g fresh lasagne sheets
- 375 g low-fat ricotta cheese
- 1/2 cup grated reduced-fat cheese

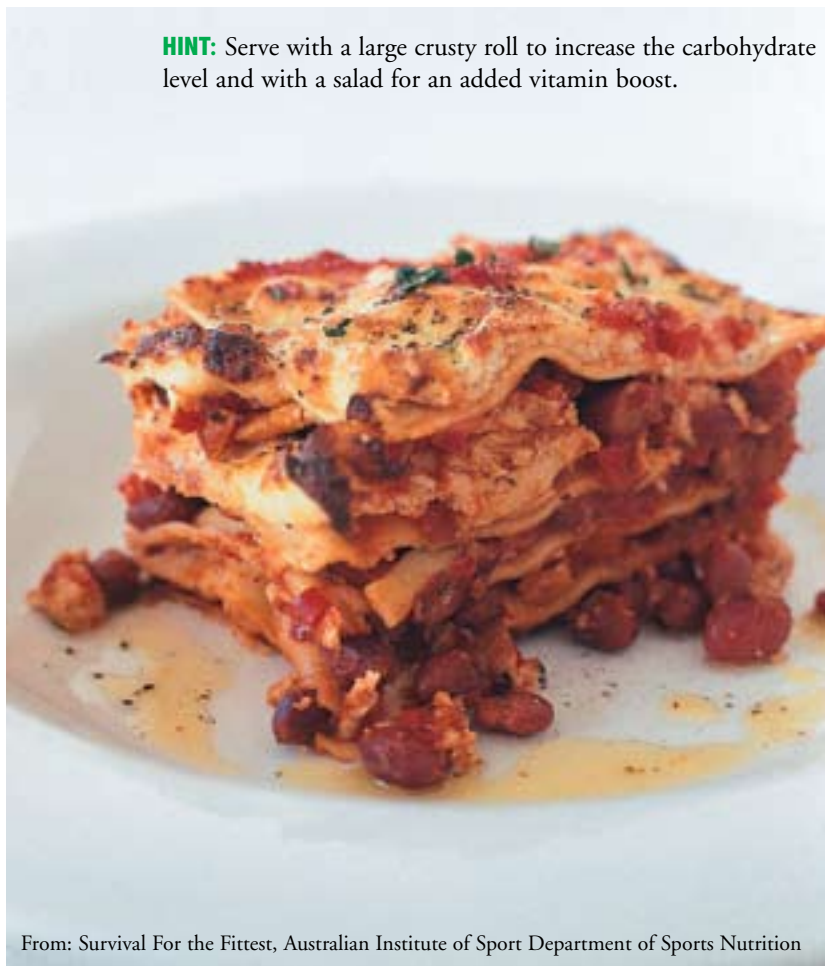
Preheat the oven to moderate (180°C or 350°F). Spray a nonstick frying pan with oil and heat. Cook the mince over high heat for about 5 minutes, or until browned, using a wooden spoon to break up the lumps. Add the capsicum, chilli, beans, pasta sauce and tomatoes and stir to combine. Spray the base of a large lasagne dish lightly with oil. Cut the pasta sheets to size and arrange a layer of pasta over the base of the dish. Top with a thin layer of sauce. Continue layering the pasta and sauce, finishing with a layer of pasta. Spread the ricotta over the pasta, and sprinkle with the grated cheese. Bake for 30 minutes or until the lasagne begins to brown around the edges. Stand for 5 minutes before cutting into squares to serve.

Preparation time: 15 minutes

Cooking time: 40 minutes

Serves 4-6

HINT: Serve with a large crusty roll to increase the carbohydrate level and with a salad for an added vitamin boost.



From: Survival For the Fittest, Australian Institute of Sport Department of Sports Nutrition