

## Background

Sports gels are designed to deliver a substantial amount of carbohydrate in a compact and easily transported form, providing a large fuel boost in a single serving. Most of these are a viscous liquid, although chewable gels also exist. Products currently on the market typically have around 20 to 30 g of carbohydrates per serving (serving size is about 30-50 g), but commercial recipes change frequently. Ingesting sports gels with water has been shown to help maintain blood glucose levels during exercise<sup>1-3</sup> and improve exercise performance.<sup>1</sup>

However, if not used properly, sports gels can cause gastrointestinal distress. Because all sports gels are rich in carbohydrates, the body absorbs them very slowly. An adequate amount of water must be consumed with the sports gel to dilute it, lowering the osmolarity of the combined solution and increasing the absorption rate. Drinking an electrolyte replacement drink instead of water with a gel will result in improper dilution and slow absorption, as cellular fluids are drawn upon to dilute the gel, resulting in stomach irritation and dehydration.<sup>2</sup>

So although it appears that gels may be an efficient, effective way to provide energy for exercise, they come with the major concern of simultaneously taking in enough water for them to be properly absorbed.

Virtually all sports gels have two or more of the following: maltodextrin (a starch product rapidly absorbed as glucose), sugars, and caffeine (as much as 100 mg from various sources). The first two are the primary sources of carbohydrate. Other ingredients are highly variable and may include forms of sodium (salt), potassium, vitamins (A, C, E, B1, B2, B3, B5, B6, and/or B12), amino acids, fruit juice concentrates, taurine, ginseng, quercetin, etc. The gel consistency often comes from tapioca syrup.

## Dose Range and Upper Limit:

### *Food and Nutrition Board DRI:*

**RDA/AI:** Not relevant due to variations and combinations of ingredients. However, the RDA for carbohydrate (including sugars) is 130 g/d for both men and women ages 19-50.<sup>4</sup> For sodium and potassium, the AIs are 1.5 g/d and 4.7 g/d, respectively.<sup>5</sup> Information on DRIs for caffeine, vitamins, amino acids, and quercetin are discussed in separate monographs.

**Upper Limit:** Not relevant due to variations and combinations of ingredients. No UL has been established for carbohydrate or potassium; for sodium it is 2.3 g/d.<sup>5</sup>

**Doses Used in Randomized Clinical Trials:** "An energy gel composed of 25 grams of CHO taken with 200 ml of fluid was able to maintain blood glucose levels during a two hour run at 70%  $VO_{2max}$  when compared to a placebo."<sup>2</sup>

**Toxicology Data:** No data found.

## Evaluation of Potential Benefits

Sports gels provide quick sources of carbohydrates before and during exercise to help maintain blood glucose levels and improve performance.<sup>1-3</sup>

## Potential Detrimental Effects on...

**Military Performance:** Gastrointestinal intolerance may occur due to concentrated carbohydrate load, especially if consumed without adequate water or with a sports drink instead of water.<sup>2</sup>

**Military Survivability:** No data found.

## Other Health Risks

Use of sports gels may lead to overconsumption or over-reliance on low-nutrient carbohydrate sources.<sup>2</sup> In general, they do not contain significant amounts of other required nutrients, and some contain caffeine and herbs that may produce unwanted effects, so it is important to read labels for nutritional content, instructions for use, and possible warnings.

## Interactions with Medications or Other Bioactive Substances

No data found. However, some ingredients may have interactions when taken individually. For details of potential interactions associated with individual ingredients, visit the Natural Medicines Comprehensive Database.<sup>6</sup>

## Withdrawal Effects

No data found.

## Concern and Benefit Estimate (see Dietary Supplement Risk Matrix)

*Benefit potential:* Moderate

*Risk (safety concern):* Minimal

*Classification score:* **3**

Sports gels are designed to provide convenient means to obtain carbohydrates, but they must be consumed with water to avoid potential gastrointestinal distress. They should not be combined with sports drinks, as this could result in overconsumption of concentrated carbohydrates.

## References

1. Campbell C, Prince D, Braun M, Applegate E, et al. Carbohydrate-Supplement Form and Exercise Performance. *Int. J. Sport Nutr. Exerc. Metab.* 2008;18(2):179-90.
2. Deuster P, Maier S, Moore V, Paton J, et al. Dietary Supplements and Military Divers - A Synopsis for Undersea Medical Officers. In: Deuster PA, Simmons RG, eds. Bethesda, MD: Uniformed Services University of the Health Sciences; 2004: <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA511570&Location=U2&doc=GetTRDoc.pdf>.
3. Patterson SD, Gray SC. Carbohydrate-Gel Supplementation and Endurance Performance During Intermittent High-Intensity Shuttle Running. *Int. J. Sport Nutr. Exerc. Metab.* 2007;17(5):445-55.
4. Panel on Micronutrients, Panel on the Definition of Dietary Fiber, Subcommittees on Upper Reference Levels of Nutrients, Subcommittee on Interpretation and Uses of Dietary Reference Intakes, et al. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients)*. Washington, DC: Food and Nutrition Board, Institute of Medicine, National Academy of Sciences; 2005.
5. Panel on Dietary Reference Intakes for Electrolytes and Water, Standing Committee on the Scientific Evaluation of Dietary Reference Intakes. *Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate*. Washington, DC: Food and Nutrition Board, Institute of Medicine, National Academy of Sciences; 2005.
6. Jellin J, Gregory, PJ, eds. (Various). *Natural Medicines Comprehensive Database* 2011; <http://www.naturaldatabase.com>