

How to Choose the Right Sports Drink

-by Trent Stellingwerff-

Over the past three years I've had the opportunity to conduct formal presentations at events as large as Ironman Triathlon Canada and the Ottawa, Toronto, Victoria and Vancouver Marathons, as well as lead smaller informal talks for university varsity sports teams and at Running Room clinics. Probably the largest area of inquires that I receive during the question and answer periods or information sessions has to do with the effectiveness of different products that have recently become available for athletes. Over the past 5⁺ years the number of products available for athletes to consume before, during and after exercise has exploded into the market. I'm hoping that by reading this article you will be more informed to know the physiological and nutritional reasons for having certain items in a sports drink, so that you will be better prepared to scrutinize the effectiveness of the sports drinks.

Sports Drink Market

The primary hurdle that scientists have with the sports nutrition and sports drink market is that the major increase and proliferation of available ergogenic products has far outstripped the scientific communities ability to test for actual ergogenic effects or *claims* of such products. An ergogenic aid is any substance or phenomena *believed* to increase performance. An ergogenic aid can range from carbohydrate loading, to illegal substances such as steroids, to the topic of this article, sports drinks. Regardless of the product, or more importantly regardless of the product's claims, there has been considerable research examining the ingredients of sports drinks. Therefore, once you understand what the ingredients do, or in most cases, don't do, you'll be in a much better position to assess the products.

Sports Drinks Before and During Exercise or Competition

Without a doubt, fluids and foods that contain more than water--carbohydrate and electrolytes--are vital for proper body function, as well as recovery and repair. But, many of these extra items serve absolutely no essential purpose in a sport drink that you take within the few hours before and during competition. So, while certain vitamins, minerals or amino acids are indeed very important in your daily diet, they are generally not required during exercise and competition, and potentially only serve to increase the chance for stomach upset. Figure 1 outlines the major considerations that you need to make when scrutinizing your current sports drink or analyzing new sports drinks¹. It also compares many of the major brands of sports drinks, as well as a couple of juices and colas. As you can see in Figure 1, there are 6 major areas that should be identified when looking at a sports drink product, which are explained below:

- I. **Carbohydrate Content (%)**: Much research has gone into looking at different concentrations of carbohydrates or sugars that go into sports drinks. The bottom line is that more is definitely not better². A beverage with a 6% carbohydrate solution (about 14g of sugar per 8 fluid oz.) is ideal for sweetness, stomach emptying, fluid absorption and energy delivery to the muscles. Beverages with higher concentrations tend to be too sweet, increase the likelihood of stomach upset, slow fluid absorption and also slow stomach emptying. Having the concentrated sugar solution sit in your stomach is functionally useless; therefore, having a solution at the proper consistency for promoting stomach emptying into the intestine is vital.
- II. **Type of Carbohydrate**: Again, many studies have examined the type of carbohydrate (or simple vs. complex sugars) in optimal sports beverages³. The uptake of both glucose and fructose into the blood stream from the intestine is dependent upon two different transporters: one transporter for glucose and one for fructose. Therefore, having several simple sugars, such as both glucose and fructose that utilize both transporters, optimizes sugar uptake into the blood stream even more than a single sugar. The disaccharide sucrose (glucose + fructose) in conjunction with glucose and fructose, also works well. Beware of drinks that are very high in fructose, or fructose alone, as they can cause gastrointestinal upset because it slows intestinal absorption.
- III. **Sodium and Potassium**: Having both sodium and potassium in your sports drinks is imperative. These are electrolytes that help fluid absorption and retention, as well as proper nerve conduction

for the optimal firing of your muscles when running. Sodium, or salt, is especially vital as this is the major electrolyte constituent that you lose when you sweat (hence the salty taste of your sweat or the sting of sweat in your eyes). Sodium also stimulates voluntary drinking. In a normal 8 fluid oz. cup you should have at least 100 mg of sodium and 25 mg of potassium. If you are a high salt sweater and it is a very warm and humid day you could potentially be losing upwards of 750 to 1000 mg of sodium per hour while you exercise. Therefore, in this unique situation you might need a sports drink that has extra electrolytes.

- IV. Vitamins: No compelling scientific data exists to suggest that adding vitamins to sports drinks will increase performance¹. In fact, some B vitamins diminish the taste of a beverage and actually discourage drinking. However, after exercise, during recovery, and for proper day-to-day nutrition, vitamins are essential.
- V. Carbonation: Most research shows that carbonation discourages fluid intake due to stomach bloating and mild throat burn⁴. You can quickly appreciate what a carbonated beverage would do in your stomach when bouncing around during running, if you just shake up a can of pop before opening it!
- VI. Preservatives: Like carbonation, many preservatives also cause throat burn, making it more difficult to drink a beverage consistently and quickly. Look out for preservatives such as potassium benzoate or sodium benzoate.

Post-Exercise Considerations

Like I outlined in a previous Running Room magazine article on 'Optimizing Nutrition and Hydration After Exercise' (Jan./ Feb., 2004 Running Room Magazine issue), your body is similar to a sponge and the most important thing immediately after exercise is to emphasize getting enough carbohydrates to initiate that 'Glycogen Replenishment Window'. At this point, as long as you are getting about 60 g of carbohydrate per hour for the first two hours you will be on your way to recovery. If you can compliment this with protein, vitamins and minerals that is ideal. Utilizing drinks that have a good source of carbohydrates, *along* with these other ingredients, after exercise is fine. But, one needs to remember that sports drinks are only a temporary fix to initiate recovery and regeneration. You should be preparing or eating a well balanced, mixed meal.

Final Summary:

In summary, as you can read above and in Figure 1, finding a sports drink that utilizes the simple sugars of glucose and fructose (or sucrose) in about a 6% carbohydrate solution, with the proper amounts of electrolytes and without any vitamins, preservatives, carbonation or other unnecessary ingredients, will result in an ideal sports drink for immediately before and during exercise and competition. Also, www.gatorade.com, has a very good drink comparison chart that can easily be downloaded. This chart not only features their own (Gatorade) brand, but all of the other major sports drink brands. In the next Running Room magazine, watch for information on the huge explosion of energy drinks, vitamins, nutraceuticals, pills and potions on the market and a detailed list of claims, as well as the actual facts of the specific ingredients in items.

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References

1. Sports Drinks: Basic Science and Practical Aspects. Editors: Ronald J. Maughan and Robert Murray. *Nutrition in Exercise and Sport*. CRC Press, 2001.
2. Murray, R. et al. (1989). Carbohydrate feeding and exercise: Effect of beverage carbohydrate content. *Eur. J. Appl. Physiology*. 59: 152-158.
3. Murray, R. et al. (1989). The effects of glucose, fructose and sucrose ingestion during exercise. *Medicine and Science in Sports and Exercise*. 21(3): 275-282.
4. Passe, D. et al. (1997). The effects of beverage carbonation on sensory responses and voluntary fluid intake during exercise. *Int. Journal of Sport Nutr.* 7: 286-297.

Figure 1. Comparison of some common sports drinks.

Optimal Formulation for Sports Drinks in an 8 fluid oz. cup						
Sports Drink	Carb. Content ~6 % Solution	Carb. Type sucrose, gluc. & fructose	Sodium (mg) > 100mg	Potassium (mg) > 25mg	Carbonation NO	Vitamins NO
Acclerade	7%	sucr., fruct.	127	43	No	No
Cytomax	6%	fruct., glucose	70	77	No	No
Gatorade	6%	fruct., glucose sucrose	110	30	No	No
Powerade	8%	gluc., high fruct. maltodextrin	55	30	No	No
Ultima	2%	maltodextrin	8	16	No	No
<u>Other Drinks</u>						
Coca-Cola	11%	high fruct. sucrose	33	0	Yes	No
Tap Water	0%	nil	0	0	No	No
Orange Juice	11%	fruct., glucose sucrose	3	496	No	Yes
Red Bull	11%	sucro., gluc.	207	0	Yes	Yes