

Endurance Drinks! Jose Antonio, Ph.D.

For the endurance athlete, the keys to performance are low body weight (low body fat), an efficient stride, stroke or pedal, and the ability to last longer than the Energizer bunny after 10 shots of espresso. Let's assume you've taken care of the training aspect; you train smart, you train hard, and you know when to rest. What about the nutrient side of things? What do you pour down your mouth to keep that endurance machine humming?

Let's just say that gone are the days when water or a simple sports drink will do. Certainly, water helps. And sports drinks are even better. But why settle for a Volvo when you can be rolling in a Ferrari? To wit: I present to you the Ferrari of supplement combinations. This ain't your grandma's sports drink!

According to my fellow nerd science buds, it's generally accepted that consuming traditional sports drinks (i.e. water, 6-8% carbohydrate, electrolytes [sodium, potassium]) during exercise helps performance and keeps you hydrated. Okay, that's cool. But let's take this sports drink a step further. Let's add some protein!

In a study from James Madison University[1], scientists determined whether endurance cycling performance and post-exercise muscle damage were altered when consuming a carbohydrate and protein beverage (CHO+P; 7.3% and 1.8% concentrations) versus a carbohydrate-only (CHO; 7.3%) beverage (Accelerade versus Gatorade). They had 15 male cyclists (average $\dot{V}O_{2peak}$ of 52.6 ml/kg/min) ride a cycle ergometer at 75% $\dot{V}O_{2peak}$ to exhaustion; 12 to 15 hours later, they performed a second ride to exhaustion at 85% of $\dot{V}O_{2peak}$.

Subjects consumed 1.8 milliliters per kilogram of body weight (BW) of either CHO or CHO+P beverage every 15 min of exercise, and 10 milliliters per kilogram of body weight immediately after exercise. Beverages were matched for carbohydrate content, resulting in 20% less calories in CHO beverage versus the CHO+P. Subjects were blinded to treatment beverage and repeated the same protocol seven to 14 days later with the other beverage. In the first ride to exhaustion, subjects rode 29% longer when consuming the CHO+P beverage (106 min) than the CHO beverage (82 min). In the second ride to exhaustion, subjects rode 40% longer when consuming the CHO+P beverage (44 min) than when consuming the CHO beverage (31 min).

And to top it off, the amount of muscle damage was 83% lower after the CHO+P trial than the CHO trial. So if you want to get even better performance and recovery, add a touch of protein (e.g. whey) to your sports drink. You don't need much, maybe 5-6 grams. But there's still another missing piece.

Caffeine! This ingredient is up there among the endurance athletes best friend. One of the first studies to investigate caffeine's effect on exercise metabolism and performance was performed by Dr. David Costill, one of the icons of exercise physiology. [2] In his study, subjects consumed decaffeinated coffee or decaffeinated coffee with 330 mg of caffeine 60 minutes prior to exercise. Time to exhaustion was over 19% greater in the caffeine trial compared to the decaffeinated trial. Another scientist found that caffeine supplementation prior to exercise was found to reduce muscle glycogen utilization by 30%.[3]

More recent work [4] by Canadian physiologists have further substantiated the ergogenic effects of caffeine as well as how this effect can be maintained throughout the day. They found that caffeine ingestion significantly increased exercise time to exhaustion during a morning exercise bout by up to 14%. This effect was maintained in the afternoon! Thus, it was concluded that re-dosing with caffeine after exhaustive exercise in the morning was not necessary to maintain the ergogenic effect during subsequent exercise six hours later. From a practical standpoint, this shows that one can ingest caffeine in the morning and still derive benefits later in the day. So what's the take home message for you endurance athletes!?

First of all, consuming fluids during and post-exercise is critical for maintaining hydration status, enhancing performance, and expediting recovery. Adding protein to a carbohydrate-containing beverage may enhance performance, lessen skeletal muscle damage, and speed up recovery. On top of that, a dose of 300 mg of caffeine can further enhance your performance. So here's the take home strategy if you are in an endurance event.

- 1) take a 300 mg dose of caffeine (pill or 3 cups of coffee) 30 to 45 minutes before you train or race
- 2) Consume a sports drink that has protein during the event and immediately after the event to help performance and speed up recovery.

Citius, Altius, Fortius!

References

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