

Electrolyte Replacement, Explained

Do you need to sweat the small stuff?

By Emily Brown

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Runners have talked about electrolytes for decades. Now the general public is getting in on the act, thanks to widespread marketing for not just sport drinks, but electrolyte-enhanced waters, teas and other beverages. Amid the claims of improved performance and recovery, the most basic questions are seldom asked: What exactly are electrolytes? And do runners, let alone the general population, really need to be concerned about replenishing them?

Chemically, an electrolyte is a substance that, when in fluid, dissociates into electrically charged ions. The positive or negative charge carried by these ions is what allows our body's cells to use electrolytes to carry electrical impulses throughout the body. When you're running, electrolytes are crucial in maintaining your body's ability to transmit nerve impulses and contract muscles. Electrolytes serve other biological functions, too, including water balance and distribution to working cells as well as acid-base balance.

The electrolytes required by our bodies to perform these functions include sodium, chloride, potassium, magnesium and calcium.

The typical American diet contains an abundance of each of these, which exist at normal levels in most healthy individuals. However, certain medical conditions, especially diseases involving the kidneys, can result in severe imbalances. In addition, any illness causing profuse vomiting or diarrhea can leave an individual with depleted levels of certain electrolytes. That said, most healthy individuals with a good diet consisting of a wide variety of foods don't need to be concerned with electrolyte replacement through the use of electrolyte-enhanced beverages.

For athletes, however, certain situations may contribute to electrolyte losses, in which case proper replacement becomes important. The main reason athletes need to think about replacing electrolytes is because electrolytes are lost from the body through sweat. Sodium and potassium are lost in the greatest amounts via sweat, while magnesium and chloride are lost in only small amounts.

For the most part, the more you sweat, the more electrolytes you'll lose while running. If you sweat a lot and/or you seem to be caked with salt after runs, you can probably assume that you're losing a fair amount of electrolytes during your runs and need to pay special attention to replacing them. Sweat rates can range from 0.3 to 2.4L per hour (roughly a half pound to 5 pounds per hour). To determine your sweat rate, weigh yourself before and after running; each pound lost equates to ~2 cups of fluid. Although individual concentrations will vary widely, one pound of sweat contains approximately 80-100mg of potassium and 400-700mg of sodium.

The symptoms of electrolyte imbalance are often the same as those of dehydration, since the two tend to go hand in hand. A common symptom is muscle and/or abdominal cramping. Other symptoms include light-headedness, nausea, confusion and muscle spasms.

If you are a candidate for focusing on electrolyte replacement, when and how should you do so?

Again, our diets typically provide more than enough of the electrolytes we need to perform the biological functions that require them. Therefore, we don't really need to be concerned with restoring electrolytes before exercise.

During a run, fluid and electrolyte intake during exercise depends on a number of variables, mainly the environmental conditions, how hard you're running and how acclimated you are. The higher your sweat rate is, or the longer you exercise, the more important it is to try to replace

fluids and electrolytes during exercise. When it's hot or you're working out hard enough to sweat a lot, aim to drink 8-10 ounces of fluid every 10-15 minutes. Setting aside my dietitian's cap and donning my runner's cap, I agree that drinking this much on the run can be difficult, if not impossible. The best idea is to drink as much as is tolerable whenever it's available.

If you're running long, you'll want to consider sports drinks, because in addition to providing your brain and muscles with a fresh supply of energy, the carbohydrates in sports drinks have benefits related to hydration and electrolyte replacement. Research has shown that glucose, the primary sugar in most sports drinks, can increase the absorption of both water and sodium. Furthermore, sports drinks containing sodium increase fluid retention and stimulate the thirst mechanism, which can often be delayed or masked during intense workouts or competitions. When considering sports drinks to consume during exercise, look for ones containing sodium and potassium as well as ~14-16g of carbohydrate per 8 ounces. This concentration is high enough to provide adequate carbohydrate for energy but not so high that it would cause abdominal cramps or nausea and diarrhea.

Post-exercise is the most important time to consider electrolyte replacement, especially if you're unable to consume sufficient amounts of fluid during the workout. Fluid losses can be replaced by plain water only if taken along with a sufficient amount of food, preferably salty carbohydrates. Plain water alone isn't the best beverage to consume for fluid replacement because, as mentioned earlier, electrolytes (mainly sodium) are lost through sweat and need to be replaced, and plain water will dilute your blood rapidly, increasing its volume and stimulating urination. Increased urination will further lower sodium concentration and may leave you with a dangerously low level of this important electrolyte.

Despite market trends, the most reliable and efficient modes of rehydration and electrolyte replacement continue to be the ones that have stayed with us for decades. Sports drinks contain sufficient amounts of electrolytes to replace those lost in sweat while also stimulating the drive to drink. As mentioned earlier, the usual foods we eat contain far more electrolytes than sports drinks. For example, a medium banana contains about 450mg of potassium, whereas Gatorade provides 30mg per 8-ounce serving.

After a long run, a meal consisting of 8 ounces of yogurt and a can of chicken noodle soup would adequately replace lost electrolytes (potassium and sodium) and would be pretty easy to eat (not much chewing and not very strong flavors or odors). Of course, if you're going the food route for electrolyte replacement, it's important to continue to replace fluids via two cups of water for every pound lost.

As for non-caloric beverages and electrolyte tablets, there doesn't appear to be much need for such products, considering that the everyday diet provides more than enough of the essential electrolytes to support our bodies' functions. In addition, if you're doing a workout that produces enough sweat to cause electrolyte depletion, then you most likely burned a lot of calories as well and need to think about replacing those as soon as possible. That is why the best recovery is salty carbs along with fluids. If you used a noncaloric beverage or salt tablets, you would be adequately replacing fluids and electrolytes but missing out on restoring energy. Also, a can of soup and a bottle of water probably cost less than these other products and are more effective at getting the job done.

Ultimately, your best choice is what you prefer and are most likely to rapidly take in after a draining run. The key point to keep in mind is that both water and electrolytes are lost through exercise and both need to be replaced on a daily basis to ensure optimal health and performance.

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