

What Are Electrolytes And What Purpose Do They Serve?

By: Richard Drucker, B.S., M.S., N.D., Ph.D.



The popularity and notoriety of sports and energy drinks has grown with increasing zeal over the last few decades. A primary thrust of advertising is that these drinks replace and replenish electrolytes that have been lost through sweat from heavy exercise. However, although these sports drinks are used on a massive scale, many consumers are uncertain of what electrolytes are and what purpose they serve. This article will attempt to discuss the function of electrolytes in terms of the human body and health, where we can obtain them, and in what form they are best found and utilized.

Webster's Dictionary defines electrolytes as "any substance which in solution or in a liquid form is capable of conducting an electric current by the movement of its dissociated positive and negative ions."¹ An ion is an atom or molecule which has lost or gained one or more electrons, giving it a positive or negative electrical charge. A solution containing free ions thus becomes an electrically conductive medium. For example, a water solution may be a poor conductor of a low voltage current, but when a small amount of table salt is added and allowed to dissolve, the solution becomes ionic and is a better conductor of electricity. The human body functions in a similar way by utilizing these ionic qualities on a massive scale.

The primary ions of electrolytes and thus the most important are sodium (Na⁺), potassium, calcium, magnesium, chloride, hydrogen phosphate, and hydrogen carbonate. These basic electrolytes are necessary for hydration, proper muscle function and balance, normal heart rhythm and contraction, healthy nerve conduction, breathing, blood pH, and brain function. Humans require a complex electrolyte balance in order to function normally. Control of the electrolyte concentrations is carried out by a complex network of systems in the body. For example, without sufficient levels of the key electrolytes sodium and potassium not only muscle weakness or muscle cramping is possible, but nerve conduction may be severely impaired or halted altogether.

Our bodies can lose electrolytes and thus become imbalanced in several ways. This occurs primarily through sweat, but also by anything that causes a fluid loss such as diarrhea, vomiting, fever, chronic heart or kidney diseases, chronic endocrine diseases, eating disorders, bone disorders and more. Medications and diuretics used may also rid the body of vital fluids and electrolytes. Electrolyte balance or homeostasis is normally maintained by oral intake of electrolyte-containing substances and is regulated by hormones, primarily the kidneys, which also helps to flush out excess fluids and electrolytes.

The replenishment of electrolytes during normal physical activity is not as important as after heavy exercise. "It is unnecessary to replace losses of sodium, potassium and other electrolytes during exercise since it is unlikely that a significant depletion of the body's stores of these minerals will occur during normal training. However, in extreme exercising conditions over 5 or 6 hours the consumption of a complex sports drink with electrolytes is recommended."²

Electrolyte drinks contain essential elements like sodium and potassium. Unfortunately, one of the drawbacks of these drinks is the sum of their inorganic (synthetic/inert) ingredients. Further, inorganic electrolytes are significantly cheaper and less effective than organically complexed (carbon-bound) electrolytes. These inorganic electrolytes may accumulate in extra-cellular spaces, interstitial fluids and fatty tissue and in time can auto-intoxicate healthy cells, which can eventually manifest immune and/or autoimmune disease states. In addition to the inorganic electrolytes, the more popular drinks contain refined carbohydrates, chemicals and sweeteners, such as sucrose syrup, glucose-fructose syrup, high fructose corn syrup, maltodextrin, citric acid, natural and artificial flavors, salt,

sodium citrate, monopotassium phosphate, ester gum, sucrose acetate isobutyrate, and yellow 5, an artificial coloring agent.

Sucrose syrup and glucose-fructose syrup, more commonly known as sugar, occur in large quantities in these drinks. For example, one popular sports drink contains 76 grams of sugar in each bottle. High fructose corn syrup, a hyperallergenic sugar, is found in many electrolyte sports drinks and has been linked to insulin resistance, elevated triglyceride levels, and obesity. High fructose corn syrup, unlike glucose, is almost entirely metabolized in the liver. Liver function shuts down virtually everything in order to metabolize the fructose and may not perform its normal duties of bile production for fat assimilation, production of blood proteins, conversion of excess glucose into glycogen for storage and energy, and clearing the blood of drugs and other poisonous substances.

Eating high fructose corn syrup results not only in lower insulin levels, but also lower leptin levels (leptin is a protein hormone that plays a key role in regulating energy intake and energy expenditure, including appetite and metabolism). This could increase the likelihood of weight gain. Refined fructose has been known to quickly deplete the body of minerals and thus may lead to faster exhaustion.

Another hyperallergenic ingredient, sucrose, is a combination of glucose and fructose. We've already touched on the harmful effects of high fructose corn syrup. Glucose, on the other hand, is an ingredient that is found in the body naturally and is metabolized more easily while providing needed energy. Unlike high fructose corn syrup, glucose does not shut down the liver, allowing it to perform its normal functions of cleansing and maintaining the body.

In addition to the above ingredients, some electrolyte drinks are also labeled as energy drinks and contain large quantities of addicting caffeine and/or other synthetic chemical stimulants. Caffeine may cause insomnia, nervousness, headache, and tachycardia.

It's easy to see how important it is to find an exceptional liquid supplement that contains the right balance of electrolytes without the inclusion of synthetic chemical nutrients. What does one look for when choosing a good electrolyte drink?

It's important to look for liquid supplements that are organic and contain electrolytes and minerals that come from live foods as well as Fulvic Acid. Fulvic Acid is the result of the natural breakdown of organic plant matter and is absolutely necessary for proper utilization of minerals by the body. For example, minerals such as Calcium and Magnesium cannot be fully dissolved without the inclusion of Fulvic Acid, which is vital for full cellular absorption. Organically-bound Fulvic Acid is so powerful that one single molecule is capable of carrying 60 or more minerals and trace elements into the cells.⁴

Ideally, a supplement that contains electrolytes should be in carbon-bond organic form, contain a good supply of potassium, calcium, magnesium and sodium, as well as added protein (amino acids) and antioxidants to help muscles recover from the stress and strain of longer workouts.

Additionally, your liquid electrolyte supplement should contain little or no refined sugars, artificial flavors, colors or preservatives. When these basic guidelines are followed, your chances of receiving the necessary electrolytes your body needs for proper function increase dramatically. (footnotes available upon request)

About The Author: Richard Drucker, ND, is a licensed naturopath performing concentrated research and work in the natural health and nutraceutical fields for more than 20 years.