

# Sweat Savvy

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For most people, their sweat is little more than a nuisance with little consequence. For athletes, sweat is crucial for sustaining their performance, but also can cause health consequences. Sweat is released from the body in response to rising body temperatures. It helps cool the body, and carries waste from the body. Included in sweat waste are many electrolytes and minerals. Most athletes lose one to two liters (or 2-4lbs.) of sweat per hour of exercise, but some lose much more. The more sweat an athlete loses, the more electrolytes and minerals they lose. Ordinarily these micronutrient losses are insignificant, but for athletes that are heavy sweaters and that train daily, these losses can become significant and create deficits that negatively impact their performance as well as their health.

Sweat is typically comprised of water, lactate, urea, sodium, chloride, potassium, magnesium, calcium, zinc, iron, as well as many other organic and inorganic compounds. Exactly what is in sweat, and how much of each of these compounds are lost in sweat varies by individual. What an athlete has been eating, drinking, how long they have been exercising, their genetics, as well as many other factors influence the amounts of each compound lost. A formal sweat study performed in a laboratory can determine exactly what and how much of each compound comprises an individual's unique sweat. While such a test is impractical for most, becoming more aware of nutrients lost in sweat and how to replace them is realistic and prudent.

Sodium and Chloride are always leached in a much greater amount compared to the other compounds. On average, sweat and chloride losses tend to be five times greater than losses of other electrolytes, minerals, or metals. Excessive loss of fluid, sodium, and chloride is what leads to most muscle cramps while exercising. Many athletes mistakenly believe that eating bananas or oranges, which are rich in potassium, will combat cramps, but this is false. To prevent most cramps that occur during prolonged exercise, greater emphasis should be put on increased fluid and salt replacement. The minimum sodium need for an hour of outdoor exercise is 300mg., but salty sweaters may lose closer to 1000mg. per hour. The more sodium that is lost, the more fluid with sodium should be consumed. Athletes should aim to drink at least 8 oz. of fluid for every 180mg. of sodium supplemented. Sodium and chloride (table salt) is easily found in daily intake of food. While exercising, sodium and chloride can be supplemented by electrolyte pills, hydration tablets, in sport food supplements, or simply by adding salt to fluids.



Although other nutrient losses in sweat pale in comparison to the amount of fluid, sodium, and chloride lost, they can still be significant. Concentration wise, potassium is the next greatest loss in sweat. However, as a percent of daily need, the loss of magnesium is more significant. In a liter of sweat, you

could lose zero to 15% of your daily magnesium need. Magnesium is important for bone density, muscle contraction, and energy metabolism. Deficiencies can lead to muscle spasms. Vitamin D activation is also impaired when Mg. is inadequate. Magnesium is not necessarily beneficial to replace while exercising, but focus should be put on magnesium rich foods in regular dietary intake to combat excessive sweat losses. Foods that are rich in magnesium include leafy greens, legumes, and especially nuts and seeds.

An athlete can lose zero-12% of their daily calcium needs in just one liter of sweat. If an athlete typically loses one to two liters of sweat per hour and exercises for at least two hours per day, their calcium losses could be 240-480mg. of calcium (daily requirement is ~1000mg. calcium for most adults). This is especially significant for smaller athletes and females, who have higher calcium needs. The average American does not meet their daily required calcium intake. In fact, 51% of Americans supplement calcium to help meet their daily requirement. To meet minimum calcium needs, three low-fat dairy sources should be consumed daily. Highly active and heavy sweating athletes may need an additional serving of dairy each day to make up for their calcium sweat losses. Calcium controls muscle contraction and is crucial for good bone density. Blood calcium levels are well maintained by the large reservoir of calcium in bones. Therefore, calcium does not need to be supplemented while exercising. Since calcium is pulled from bones to compensate for inadequate calcium intake and/or high calcium losses via sweat, compromised bone density and increased risk for stress fracture is a concern.



Daily potassium needs are very high, but the kidney is very efficient at conserving existing potassium in the body. Therefore, potassium losses via sweat are of little concern from a performance standpoint. Adequate potassium is certainly crucial for long term health and exercise performance. The average American does not even get 56% of their daily needs. Sweat losses of potassium do not seem to increase risk of health consequences as much as the insufficient daily intake of potassium. Athletes that exercise longer than one hour do have higher daily needs of potassium. This increased need can easily be met through a variety of foods. High dietary sources of potassium include dairy products, produce, and protein foods (meat, poultry, legumes).

Only about 6% of athletes become anemic, but far more suffer from iron deficiency. Risk for anemia is higher in females and endurance athletes. Anemia certainly hinders sport performance as it limits oxygen availability to muscles. A small amount of iron is lost in sweat, but it is unlikely that it would cause anemia. Anemia and iron deficiency in athletes is usually a result of poor dietary intake. There is only 0.3-0.4 mg. iron in a liter of sweat (daily need is 8-18mg. iron). Athletes do sometimes lose additional iron through their GI tract and possibly foot strike hemolysis. These losses together with losses of iron via sweat, can have a negative impact on an athlete's iron stores, but only if an athlete's



diet is poor in iron to begin with. To increase the amount of dietary iron, foods rich in vitamin C should be consumed along with iron rich meats, fish, beans, and fortified grain products.

Many people think that sweating rids the body of toxins and they feel purified after a good sweat. Essential water, electrolytes, and trace minerals are hardly toxins. While sweating is a must for athletic performance, excessive sweat loss could contribute to nutrient deficits which can impair performance as well as health. It is important that athletes intentionally replace the sodium, chloride, potassium, calcium, magnesium, and iron that they lose through sweat by increased dietary intake of each nutrient.

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