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Q&A on Electrolyte Supplementation and the Endurance Athlete

By Jonathan Toker, Ph.D.

Why do many athletes need electrolyte supplementation?

Hyponatremia, a medical condition marked by low blood sodium levels, can lead to nausea, fatigue, cramping, vomiting, weakness, sleepiness, and in rare severe cases, even death.

Five electrolytes in particular play a pivotal role in maintaining normal human muscle function: sodium, potassium, magnesium, calcium, and chloride. A shortage of any of these electrolytes will affect athletic performance through a range a subtle to serious side effects.

Sweat typically has about 1000 mg sodium/quart; a typical sports drink has 440 mg sodium/quart. If, during the course of training, you ingest nothing but sports drinks (or worse, water), you will become hyponatremic at some point. Many sports drinks also do not address any form of supplementation of the other key electrolytes, potentially causing yet further cramping and muscle issues.

A popular and simple solution to electrolyte shortage due to sweating is supplementation using electrolyte capsules.

Why do I need more than just sodium? Table salt is easy to find and cheap to add to my drink mix...?

While sodium is the predominant electrolyte lost in sweat, a quartet of other electrolytes (potassium, magnesium, calcium, and chloride) performs crucial roles in muscle contraction, relaxation, and performance. Loss of these electrolytes over time will impair your muscles to function normally. Table salt only contains sodium chloride. Furthermore, adding too much salt to a drink will make it unpalatable and you will be less likely to actually drink it. A capsule delivers the electrolytes you need without tasting bad.

If I take salt capsules, where will I get my carbohydrates from?

A strategy that has worked for countless pros and age groupers is to separate your electrolytes from your energy sources so that you can customize the dose of each group.

This means to obtain electrolyte supplementation through capsules alone, and an energy source through solid or gel foods and/or complex carb drinks (eg. maltodextrin).

A low a high-sodium diet...

Scientific research maintains that the average Western diet is already too high in sodium and would benefit from a reduction in sodium intake. As sodium consumption increases, output in sweat also increases to maintain a healthy level in our body. Your body become acclimatized to this intake, and "needs" more sodium to maintain this level of function. However, athletic performance drives up the loss of sodium through sweat. If your diet already contains a lot of sodium, you'll need to maintain a higher level of sodium in your body to keep homeostasis (balance) and your ability to function under athletic stress. This can be accomplished by higher doses of electrolyte supplementation. If your diet is lower in sodium, you will still lose electrolytes through sweat, but you can maintain your appropriate blood electrolyte level with less supplementation. In many respects, the ideal situation is to live a low-sodium diet and supplement during heavy training and racing as needed. Using electrolyte capsules will allow you to do this easily, and to customize your dose based on individual need.

What is the science behind SaltStick™ Caps?

Simple: What is lost in sweat should be replaced by your electrolyte capsules in a quantity and form which your body can absorb. SaltStick™ Caps have been formulated to provide your body with a balanced electrolyte content in the suggested serving of 1-2 capsules per hour. Two SaltStick Caps equate to 430 mg sodium, 126 mg potassium, 22 mg magnesium, and 44 mg calcium per hour: The ideal ratio to keep you moving.

Comparison of Electrolyte Content and Cost of Common Electrolyte Supplements

Product	Per Capsule				Ave cost per capsule	Capsule Material
	Sodium	Potassium	Magnesium	Calcium		
Sweat (per 315mL)	220	63	8	16		
eload Zone™	43	14	9	5	\$ 0.16	Animal
Endurolytes™	40	25	25	50	\$ 0.16	Vegetable
Lava Salts™	158	16	1	0	\$ 0.15	Animal
SaltStick™ Caps	215	63	11	22	\$ 0.18	Vegetable
Succeed™	341	21	0	0	\$ 0.12	Animal
Sustain™	86	8	0	0	\$ 0.12	Tablet
Thermolyte™	150	43	6	13	\$ 0.14	Animal
Thermotabs™	180	15	0	0	\$ 0.07	Tablet

Numbers represent milligrams per capsule or tablet

Sweat loss is average salt loss per 11oz/315mL of sweat for the average athlete

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Chart is assembled from publicly-available information and is believed accurate at time of compilation

What is bioavailability and why does it matter?

A nutrient's **bioavailability** is the proportion of the nutrient that, when ingested, actually gets absorbed by the body. Absorption rate is important because even when a drug is absorbed completely, it may be absorbed too slowly to produce any effect. SaltStick™ Caps contain water-soluble chelated potassium, calcium and magnesium citrates and gluconates that have high bioavailability and fast absorption rates. Sodium chloride present is also bioavailable and quickly absorbed. This is in contrast to some supplements that use forms of these minerals that have lower bioavailability, are insoluble, or require high stomach acid to digest.

How the heck do you carry electrolyte capsules?

Many athletes begin by carrying capsules in zippered plastic baggies or taped to bicycle top tubes. Plastic coin purses can also be used. Due to the drawbacks of these techniques and the tendency of the capsules to turn to mush when wet, a product called the “SaltStick” dispenser was invented to safely carry capsules hidden away inside many aerobars, MTB bars or road bars, or attached to bike frames and onto hydration running belts. The SaltStick carries 6 capsules with dispensing by a simple 1-handed turn of a knob and out pops a capsule. SaltStick products were used at the 2006 Ironman World Championship by the eventual Men’s winner *and* 2nd place, along with over 50 other athletes. More information is available at www.saltstick.com.

Note: Any exercise program or changes to your diet should be reviewed with your doctor before beginning a program. Individuals with high blood pressure or any medical condition should seek professional advice prior to electrolyte supplementation.

Jonathan Toker is an elite-level triathlete who hails from Canada and lives and works in the biotech industry in Southern California. He received a Ph.D. in organic chemistry from The Scripps Research Institute in 2001. Jonathan invented the SaltStick back in 2002, and has worked tirelessly for 5 years to bring the products to market. The satisfaction of seeing his inventions help athletes achieve their dreams in training and on the racecourse is genuinely satisfying, and he hopes that the “secret” of these products gets out. Questions, comments, and references to statements made in this article can be obtained by writing to Jonathan at IT@saltstick.com