

# Performance Point

## Electrolyte Analysis of Sweat

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Athletes regularly encounter dehydration and hyperthermia during training and competition, especially in the heat. As a result, their primary challenge in this environment is optimizing performance while maintaining physiological homeostasis. During exercise, sodium loss increases as sweat rate increases, i.e. the more you sweat, the more sodium your body loses. Although one of the adaptations to training and heat acclimation is enhanced reabsorption of sodium and potassium in the kidneys, it varies with each individual. Depending on environmental conditions, diet, hydration status and ability for electrolyte reabsorption, significant losses of sweat and corresponding electrolytes can occur and may have a detrimental impact on performance. Excessive loss of sodium through sweat can lead to Hyponatremia (serum sodium levels < 125mmol/L) resulting in electrolyte imbalances in muscle and nerve tissue. For some athletes excessive sodium loss is also associated with muscle cramping.

For example, a triathlete exercising for 3 hrs @ a sweat rate of 2L/hr losing 2000mg Na/L through sweat:

- Total sodium loss = 2000mg x 2L/hr x 3hrs = 12,000mg sodium deficit
- To replace with Gatorade (110mg/250mL) would require the consumption of 27L — therefore intake of salt through food becomes imperative

Guidelines for fluid replacement before, during and after exercise are generally very clear in terms of volume and carbohydrate content, but tend to be quite vague in terms of electrolyte replacement. Generic recommendations state that adequate replacement of electrolytes occurs naturally through diet and for many individuals this may be correct. However, in dealing with elite athletes, diet and hydration impact on the ability to train, perform and recover and as such, more specific guidelines are required to increase the effectiveness of rehydration and dietary strategies.

Canadian Sport Centre Pacific is in the process of modifying a Sweat Analysis protocol currently used by the Gatorade Institute (revised by J. Stolz) which will determine the sodium and potassium content of sweat. The ability to quantify sweat rate and identify the “quality” of sweat (salty or dilute) will aid in the development of specific rehydration and dietary strategies for athletes.

### Key Strategies to Ensure that Electrolyte Balance is Maintained:

1. Know your sweat rate and electrolyte loss. Athletes with high sweat rates generally lose more sodium. If your clothes are caked with salt or your sweat tastes very salty you may be a salty sweater. See the Performance Point “Hydration” (May 2006).
2. Don’t over-hydrate with water pre-event. This can start to dilute the sodium content of your body even before the competition starts.
3. Eat saltier foods in the days leading up to your event if it is going to be hot or if you know you are a salty sweater.
4. Consume a sports drink that contains some sodium during training and competition. For example, Gatorade has 110mg of sodium for every 250ml.
5. After training and competing replace sodium with food. Some saltier foods and their sodium content are listed below:

Food or Beverage Item	Serving Size	Sodium (mg)
Chicken Noodle Soup	1 cup (250ml)	1107
Baked Beans (can)	1 cup (250ml)	1008
Dill Pickle (medium)	1 item	928
Tomato Juice	1 cup (250ml)	882
Salted Pretzels	1 ounce	483
Gatorade	1 cup (250ml)	110
Water	1 cup (250ml)	7



Equipment used for sweat analysis.

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