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Cold-weather Electrolyte Concerns for Winter Sports

By Jonathan Toker, Ph.D.

Much has been written about proper electrolyte replacement during cold-weather sports; however, as a reminder during this heart of the winter season, it's worth reconsidering the importance of your electrolyte and fluid replacement strategy at this time.

Extended periods of exercise at even moderate intensity can cause significant losses of fluid through sweating. Electrolytes, including sodium, potassium, magnesium and calcium, are present in this sweat at levels that over time will cause your body to become depleted. Muscle cramping, loss of performance, heat stress and other symptoms can result from reduced electrolyte levels. Consumption of water will act to further dilute remaining electrolyte reserves and can exacerbate symptoms, even to the point of death. Common approaches by athletes to deal with these very real nutritional issues include consuming sports drinks and/or solid electrolyte supplementation (capsules).



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Exercise in cold conditions at sports including skiing, skating and running can have a dramatic impact as compared with training in warmer conditions. First, our thirst reflex is impaired by cold weather such that drinking appears to be less “important” than during warm weather activities. Second, sweat loss can be deceptively high despite cold weather, due to the body’s additional efforts to stay warm and clothing worn. Sweat rate is dependent upon the climatic conditions, clothing, and exercise intensity. As well, water loss through respiration can be significant during periods of hard work in the cold dry air at altitude.

Don’t forget the magnesium and calcium

Many athletes now read nutrition labels carefully for sodium and potassium content. All athletes should also be aware of the body’s need to maintain proper levels of two other key electrolytes: magnesium and calcium. Magnesium is critical in muscle relaxation and ATP (energy) production. Calcium, in addition to its bound structural form of calcium phosphate in bone, as a free ion (charged calcium free in the plasma) is needed for nerve transmission and muscle contraction.

Electrolytes Essential to Exercise			
Electrolyte	Primary Roles	Dose per 240-260ml (8-12oz) of fluid	Performance Daily Intake (PDI)
Sodium	Muscle contraction Nerve transmission	150-250 mg	1,500-4,500 mg
Chloride	Peak muscle function	45-75 mg	
Potassium	Muscle contraction Nerve transmission Glycogen formation	50-80 mg	2,500-4,000 mg
Magnesium	Muscle relaxation ATP (energy) production	20-30 mg	400-800 mg
Calcium	Bone health Nerve transmission Muscle contraction	10-15 mg	1,200-1,600 mg

Ref: Kim Mueller www.Fuel-Factor.com

Sport-specific considerations:

Cross-country skiing:



Cross-country skiing, both classic and freestyle (skating), is usually performed on packed trails on skies weighing about 0.5 kg. Racing distances range from 5 to 50km (up to 90km in some cases) and last between 12-140 min. Training can include intervals, tempo and long distance efforts, similar to running. Off-ski training can include running and roller-skiing for around-the-year fitness. Water loss during racing can amount to 2-3% of body mass during 15 to 30km races,

therefore fluid replacement is recommended for races longer than 15km. Most skiers consume 100-200mL (3-6 oz) of an electrolyte sports drink every 10-15 min. in races with a duration longer than 1h. Skiers may consider wearing a hydration backpack for easy access to fluids during the day. Solid electrolyte capsules may be carried in a bag or directly on the ski pole.

Skating:

Speed skating, ice hockey and figure skating all involve various movement on skates, varying between short rapid bursts of effort to more sustained efforts. **Speed skating** events last between one and 15 minutes (500m to 10km) of intense effort such that hydration during the event is unlikely. Dry land training include aerobic activities such as cycling and running, anaerobic sessions, and strength training. Fluid should be readily available at all exercise and competition sites and consumed according to a predetermined schedule consistent with individual needs and conditions. **Ice hockey** involves significant training and competition duration such that hydration needs can be significant. Due to the high-intensity efforts and protective clothing worn, players can lose 2-3kg of body weight during a game despite consuming liquids when thirsty. Athletes should be encouraged to hydrate more frequently, before, during, and after a hockey game. **Figure skating** is a technically extreme sport that usually includes short sessions of high intensity efforts and requires a significant amount of strength. Hydration needs are similar to other athletes with a guideline to reduce the loss of body fluids during training and competition. Of particular concern to figure skaters' concern for body weight and physique is the caloric content of most sport drinks, and this group of athletes may be better served by consuming water with a solid electrolyte supplement along with a carefully chosen nutritional plan.

Alpine skiing & snowboarding:

Downhill skiing involves descending either groomed or unmaintained runs on skies weighing about 1 kg and heavy boots. **Snowboarding** on the same slopes engages different muscle groups and requires a comparable aerobic effort. Similar to cross-country skiing, climatic conditions can significantly affect the hydration needs of skiers and snowboarders. The need to maintain proper hydration levels, despite the cold weather, should not be ignored, and frequent stops between runs downhill should be included as a regular part of your on-slope experience. Some skiers/boarders may consider wearing a hydration backpack for easy access to fluids during the day. Of particular concern to skiers is the degree of protective clothing worn and the significant fluid loss that can occur. Ski racing includes significant aerobic and anaerobic effort and hydration needs will be best met pre- and post- competition, following a strategy planned ahead of time.

Running:

Running in cold weather, whether off-road, on snow, or simply in cold conditions, require athletes to pay attention to their hydration level and refuelling needs. Similar to other sports involving continuous activity, significant fluid loss can occur in all conditions. Conscientious fluid and electrolyte replacement during any effort longer than about 1 hour is important to avoid loss



of performance. Most runners consume 100-200mL (3-6 oz) of an electrolyte sports drink every 10-15 min. in training and races with a duration longer than 1h. Fluids can be carried in various waist packs, running belts and hydration backpacks.

Products for cold-weather athletes

Clif Bar:

Clif Bar has two new products especially designed for cold-weather athletes. The CLIF SHOT Hot Electrolyte and Recovery beverages are hot drinks for warming up, hydrating and refuelling before, during, or after a cold winter workout. Available in 2 flavors: Hot Apple Cider (good source of electrolytes) and Hot Chocolate (recovery drink includes protein). www.clifbar.com

SaltStick Electrolyte Caps and Dispensers:

Electrolyte capsules and dispensers powering world champions. The most comprehensive solid electrolyte source with sodium, potassium, magnesium, and calcium keeps cramps at bay. The unique capsule dispenser fits inside aerobars, road & MTB bars, and on ski poles, running belts, and backpacks: Keeps capsules clean and dry. www.saltstick.com

Gatorade:

Gatorade Endurance formula provides electrolytes and simple sugars to keep you moving. www.gatorade.com

Final Thoughts

Don't wait until you feel thirsty to begin working on an effective hydration strategy during winter sports. Proper hydration, with water and electrolytes, begins pre-workout, continues during your training or racing, and doesn't end until you properly refuel after the effort. There are lots of specific strategies and products available for athletes: find what works for you.

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 lives 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 6 years to bring the products to market.

References available upon request IT@saltstick.com