

Cold Runnings: Considerations for Training in Cold Weather

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To the people who don't regularly engage in exercise - especially running, you may not get it. You know, some asshole you see all bundled up running outside in Siberia-esque weather that we experience in the north during the winter months. But to the non-exerciser, specifically the non-runner, this makes no sense. These people don't know that if you desire results - which may range from weight loss to improving performance, consistency and dedication are necessary requisites. Sometimes trekking the road (literally) to weight loss and increased performance is one that cold, blustery, and potentially deleterious to health, that is, if you're not careful. Yes, its conundrum of sorts, but, analogous to a liberal arts major needing math classes to graduate college, it's a necessary evil. And, unless you call a beachside resort in the Caymans home (I'd say south Florida, however, it does get cold there), this is a training conundrum worth cracking.

We really just can't limit our thinking to running, as many sports, especially those that extend deep into the fall months and ending in the early winter, such as football, field hockey, and baseball, all require similar considerations. A lot of people complain about the weather around this time of year, but not many consider some of the dangers of exercising outdoors in cold weather. Until recent research - some of which can be found in this article, not much attention was paid to the hazards of cold weather training and/or competition. Seemingly endless volumes of research articles and textbooks are dedicated to training in the heat; however, there is a comparatively scant amount of material that covers cold weather exercise. A lot of people think "Oh, I'll just add another layer" or will pick up a snazzy new piece of name brand cold gear - which some studies have suggested that they retain the body heat lost in colder weather, but some health risks of training in cold weather stem a lot deeper than just keeping warm.

Recently, we've turned our attention to the train-wreck that is Minnesota Vikings stadium situation - having to relocate from the Metrodome (which could probably be renamed Metro Stadium, due to the gaping hole in the roof caused by heaps of snow that collected during a blizzard) to Ford Field in Detroit, to finally concluding their home season finale at TCF Stadium, home of the Minnesota Gophers football team. A few players griped about the hard surface, which had frozen solid in the frigid weather since the Gophers season wrapped up, forgetting some important issues that must be considered when competing or training in the cold.

Hypothermia

Though staved off by warm clothing and bouts of exercise which lead to metabolic heat production, hypothermia can become a concern during prolonged periods of exertion in cold weather. During hypothermia, the body's core temperature dips below 95°F (35°C) and can continue to fall below 90°F (32°C) (1). Symptoms may range from impaired fine motor control - largely due to a drastic reduction in neural transmission and an increase in vasoconstriction found in mild cases to decreased respiration and possible cardiac arrest, coma, or death, in severe cases. It should be noted that symptoms may vary widely among different individuals and are not solely dependent upon exposure times. Cases of hypothermia can worsen in cold, wet, and windy conditions.

Frostbite

Frostbite typically occurs when skin temperature sinks below 28°F (-2°C) and is initially characterized by dry, waxy skin that is almost taut (1). More severe cases of frostbite include: tissue necrosis, hemorrhagic blistering, and extensive damage to the musculoskeletal system, which may also include permanent nerve damage. Frostbite, like hypothermia, can worsen in windy conditions - a topic that'll be covered later on.

Chilbain

Chilbain, or pernio, is a dermatological response to cold and wet conditions. Inflammatory responses, such as warm, swelling skin may result in mild cases, whereas painful blisters develop in more severe cases (1).

Hypothermia is caused by the removal of body heat; which can occur via four mechanisms: conduction, convection, radiation - which depend upon a temperature gradient between skin and the environment, and evaporation (2). While often a favorite term of meteorologists who work in the Northeast or Midwest during winter months, wind chill, can adversely affect body temperature and have a greater impact on those exercising outdoors, due to their movement adding to the wind speed, thus enlarging the temperature gradient between skin and the environment resulting in greater overall heat loss.

Adaptations to cold weather and considerations

While numerous adaptations to cold weather exercise occur, the main ones include: an increase in non-shivering thermogenesis, improved sleep in cold environments, and improve circulation to the appendages. When the body shivers, it is rapidly depleting its glycogen stores to keep warm. Shivering can also interrupt and perhaps prevent sleeping. Improved circulation is only temporary and often occurs in people who are regularly exposed to cold environments. Though people become more resistant to losing body heat in cold weather due to repeated exposures, they may also experience more exercise induced bronchospasms (EIB,) (3) which may increase in both severity and occurrence in dryer air (4,6). Athletes, including Olympic cross-country skiers, who suffer from the highest incidence of EIB compared to other winter sports, are also susceptible to EIB in cold weather (5). Training to compete at higher elevations in colder weather, likely requires a longer period of acclimatization (7). Stroke volume and heart rate may also decrease at rest (8), coordinative abilities and cognition decrease in colder environments (9, 10). It should be noted that adaptation to colder climates is multi factorial and should take into account each individual's nutritional status, age, sex, body mass, body composition – people with higher body fat percentages are typically less sensitive to the cold, nicotine usage – will may exacerbate vasoconstriction in colder environments (1,11). Also, a temperature below freezing (32°F / 0°C) is not required to induce a hypothermia or any other cold related injury (1,2).

If one is exercising in the cold weather, especially if they haven't yet adapted to the cold, they may want to consider ingesting additional carbohydrates to compensate for the energy expended via shivering. Special attention should be paid to clothing, specifically with regards to layering. Polyester, wool, silk, or polypropylene are often regarded as ideal first layers as they wick moisture away from the skin to the next layer for subsequent evaporation (2). Multiple thin layers are superior to one or two thick layers in terms of providing better insulation and they should fit snugly (2). As stated above, one should permit more time to adjust to training or competing in cold climates, especially if the training or competition is to occur at a higher altitude. Athletes should allow themselves more time to warm-up pre-exercise or pre-competition and employ periods of active rest to keep warm. Healthcare and fitness professionals, including athletic training staffs, physicians, and coaches, should be aware of what signs to look for in

cold injuries and should thoroughly assess and/or refer someone who is suspected of experiencing a cold-related injury or illness.

Also, if you're the "asshole" running outside, while everyone is sitting home by their fireplace, or whizzing past you in their cars on the narrow road – with their heat on full blast – remember to take precautions when you exercise in cold weather. Not only can it help your performance, but also save your life.

Until next time...

Stay warm!

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