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The Research File

Information for professionals from the Canadian Fitness and Lifestyle Research Institute

Exercise in the Cold

Skiing, skating, and snowshoeing are popular wintertime activities in Canada. Most people who pursue these activities are accustomed to being active in the cold, and take the necessary precautions.

There are also other sports—pursued on a year-round basis in various parts of Canada—which require the same respect for a cold environment. These include scuba diving, long-distance swimming, triathlons, running, and cycling.

The Canadian Fitness and Lifestyle Research Institute (a national agency supported by Fitness Canada) is committed to encouraging active living for all Canadians. Educating people about exercising safely in the cold is a logical part of this mandate.

In this article, the Institute summarizes the key issues. The "Problem Prevention" section offers some practical tips that you can pass along to people with whom you work.

Response to the Cold

Exposure to cold increases heat loss and challenges the body's thermal balance. The body responds to this challenge in two ways:

- *Shivering* substantially increases the metabolic rate. Virtually all the energy expended through shivering is for heat production.
- *Vasoconstriction* of skin blood vessels reduces peripheral blood flow. Blood is "rerouted" internally to help keep vital organs warm.

Although these two physiological responses help, the body does not acclimatize well to cold weather. Other precautions are necessary.

Performance in the Cold

The body's ability to perform in cold conditions is determined by a number of factors:

- If core body temperature drops below normal, it is necessary to exercise more vigorously to restore it to normal and maintain usual intensity.
- With more energy required to maintain regular intensity, the level of glycogen (i.e., stored muscle fuel) may be depleted more quickly.
- When blood flow to muscles is reduced by vasoconstriction, the amount of oxygen travelling to working muscles will decrease.
- The anaerobic threshold, in turn, may be reduced, and lactic acid may accumulate more quickly.

Thus, fatigue may come sooner in cold weather. This will make it more difficult to maintain duration or distances normally achieved in warmer conditions.

Health Risks

Frostbite and hypothermia are the most serious threats from exposure to cold.

- *Frostbite* occurs when so much heat is lost that tissue water freezes. Ears, facial tissue, fingers, and toes are most susceptible to damage. Early signs include tissue that is waxy, white, numb, tingly, and cold. (This local cold stress can lead to significant increases in blood pressure, especially in men, and could be harmful to those with hypertension.)
- *Hypothermia* is a potentially fatal condition in which core body temperature falls dangerously below the normal 37°C. Initial symptoms include numbness in the hands and feet, and shivering. A worsening condition can lead to more severe shivering, slurred speech, and drowsiness.

When the symptoms of either of these conditions appear, it is crucial to seek shelter, get into dry clothing, and have a snack (preferably a hot drink). Serious cases of frostbite or hypothermia require immediate medical attention.

Safe and Enjoyable Activities

Activity in cold weather *can* be safe and enjoyable if proper precautions are taken. The listed suggestions can help prevent cold injury while being active in Canada's winter wonderland.

Suggested Reading

For a scientific summary of this topic, see "Physiology of Exercise in the Cold," by Thomas J. Doubt, in *Sports Medicine*, Volume 11, 1991. For practical tips and an organized program for winter activities, check at your local bookstore for *Expres: The Exercise Prescription*, prepared by ParticipACTION and published by MacMillan of Canada.

Problem Prevention

- ***Dress for the weather***. *Layers* of loose-fitting clothing trap air and provide good insulation. The inner layer should be absorbent; the middle layer(s) warm; and the outer layer water repellant and wind resistant.
- ***Top things off***. Keep the extremities covered. Wear warm socks, mitts or gloves, a toque, and even a face mask in particularly cold weather.
- ***Get set***. Warm up and stretch indoors before going out in the cold.
- ***Beware of the wind***. Take the wind chill factor into account, and plan routes so that the wind is at your back near the end of the session.
- ***Watch for fatigue***. Don't push yourself in extremely cold weather.
- ***Use the buddy system***. Try to be active with a companion, and keep your eye on one another.
- ***Don't dally***. When activity is finished, come in from the cold and change into dry clothing as soon as possible.

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