

# Exercises in the Cold

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## Abstract

*The weather greatly influences performance, the state of the body, as well as the effect of exercise. Many specialists find training done in winter much more productive, and furthermore a method of tempering. Harsh weather conditions can lead to hardening, but it can also have the opposite effect if the body's stability against weather factors is not gradually increased. Winter is the ideal time to do extensive training that promotes endurance, burns body fat, and improves body composition. The aim of this article is to discuss the pros and cons of outdoor physical exercise practiced at low temperatures.*

**Keywords:** training, cold, peripheral vasoconstriction, shivering

**JEL classification:** I15, I18, I28

**DOI:** 10.24818/mrt.23.15.02.04

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## 1. Introduction

Through this article, we aim to expose both the advantages and the problems created by practicing outdoor physical exercises at low temperatures, mainly in winter.

Through acclimatization, functional changes in the body appear with a compensatory role. In a few days of exposure to cold, the feeling of cold is gradually lost, acclimatization takes time. Exposure to weather conditions is done gradually and in advance. The nose has the role of filtering, moistening the air and heating; therefore, it is good that inspiration is done through the nose. If we manage to inhale most of the air through the nose instead of the mouth, even if the outside air is around -10°C, the indoor air will be warmed up to about 15°C once it has moved 2cm into the passages nasal. Once it reaches the larynx, it is around 21°C and higher when entering the lungs, where the temperature of the flowing air is around 27°C.

## 2. Content

Extreme cold inhibits the nervous system and decreases muscle elasticity, which leads to a decrease in the force of contraction, but also in the functionality of

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muscles and joints. The conditions that often limit the physiological responses and health risks associated with cold stress are important issues in exercise science. We define cold stress here as any environmental condition that causes loss of body heat that threatens homeostasis.

Most of our adjustments to heat stress are physiological. Training done at low temperatures leads to high rates of fat metabolism and glycogen breakdown.

**Glycogen breakdown is caused by two factors:**

**1) By trembling** - it causes the muscles to deplete their glycogen stores 5-6 times more than normal; is nothing more than rapid muscle contractions that have the role of generating heat. When you are very cold and you don't have the possibility to quickly take shelter somewhere to warm up, then all you can do is to... shiver. Do not try to inhibit this automatic response of the body. It is his "emergency" method to generate heat. But it is also a clear signal that the thermoregulation capacity of the body is hardly put to test. This high rate of glycogen consumption tends to deplete our muscle glycogen stores, causing metabolism to turn fat burn for energy.

**2) Increased level of adrenaline in the blood**

Adrenaline can also increase fat metabolism and there is evidence that insulin levels are lower during the winter period. An effect that can also cause fat loss. However, the colder days of the year can be the best time to lose weight and improve body composition.

Especially since the cold also increases the metabolic rate during recovery. In addition, cold training is often associated with increased energy needed for exercise, which helps us to achieve a negative energy balance.

The hypothalamus has a temperature set point of about 37 degrees, but daily fluctuations in body temperature can be as much as 1 degree. A drop in either skin or blood temperature provides feedback to the thermoregulatory center to activate mechanisms that conserve body heat and increase heat production. The main means by which our bodies avoid excessive heat loss are:

✓ Peripheral vasoconstriction occurs because of sympathetic stimulation of the smooth muscle surrounding the arterioles in the skin. This stimulation causes smooth muscle to contract, reduces blood flow to the body shell, constricts arterioles, and minimizes heat loss;

✓ Non-shivering thermogenesis and when the change in skin blood flow is not adequate to prevent heat loss, non-shivering thermogenesis is increased. Increasing metabolic rate increases internal heat production;

✓ Shivering is a rapid, involuntary cycle of skeletal muscle contraction and relaxation that can cause an increase in body heat. Because these heat production and conservation mechanisms or effectors are often inadequate, we must rely on behavioral responses like dressing up and putting on more clothes to help insulate our deep body tissues.



### 3. Proposals

Some recommendations for those who exercise or due physical effort in cold conditions:

- To keep the body warm, we must wear several layers of clothes, because they are warmer than a single thick piece of clothing. Another advantage of the "layers" is the fact that you can add or remove, thus being able to adjust the temperature more easily.
- We must wear gloves and cover our heads when we exert ourselves in the cold, because a large part of the body's temperature is lost at the level of the hands, head, and neck.
- Cover your mouth to warm the air you inhale.
- Is recommended to inhale through the nose most of the time of practicing physical exercises.
- Wear only dry clothes. Wet clothing from sweat and precipitation significantly increases heat loss.
- Choose only shoes that absorb sweat and thus prevent the temperature drop at the level of the feet.
- We must hydrate properly, because dehydration affects the body's ability to regulate temperature and increases the risk of frostbite.
- It is mandatory to avoid the consumption of alcohol or drinks with caffeine because they predispose to dehydration. Alcohol dilates blood vessels and increases heat loss, increasing the risk of hypothermia.

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