The polar climate is considered one of the most demanding environments on Earth. Due to the occurrence of extremely low air temperatures, it is also referred to as the most severe. Recorded temperatures throughout the year range from -60 to -70 degrees Celsius in winter and from -30 to -50 degrees Celsius in summer. The strong winds further enhance the subjective feeling of cold. These are undoubtedly challenging living conditions, yet many people decide to embark on extreme expeditions. So, do we know how nutrition should look in low temperatures?

**What happens to us in very low temperatures?**

Being in such conditions makes humans particularly **susceptible to heat loss through the skin**. It is reported that in cold environments, it can reach up to **80%.** This mechanism relies on heat loss through convection conduction via moist clothing, contact with cold objects, and radiation.

The body's natural defense reaction is the **contraction of blood vessels**, causing a **decrease in blood flow through the tissues**. This results in a general decrease in body temperature and a change in the rate of temperature exchange with the environment. The body, defending itself against heat loss, utilizes **shivering thermogenesis** (performing involuntary contractions of skeletal muscles) as well as **non-shivering thermogenesis** (neural and hormonal stimulation). These additional **activities triple metabolic heat production**. In a cold climate environment, the human **demand for water, energy, and nutrients increases.**

**Energy Requirements in Low Temperatures**

The energy value of the food consumed by individuals in cold climates should **fully cover the energy requirements resulting from their activity and provide the energy necessary to heat the body.**

Studies conducted for the military have shown that in extreme cold conditions, energy requirements **increased by 30% to 50%.** For example, it was estimated that soldiers in temperatures ranging from -10 to +5 degrees Celsius had an energy expenditure level of 5250 kcal per day, and at -15 degrees Celsius, it was 5322 kcal per day. The total value of energy expenditure depended on the intensity of the work performed, outerwear, and additional burdens.

**Hydration in Low Temperatures**

Regardless of location and environmental conditions, adequate water intake is a very important element of proper body functioning. Among the most important factors of **water loss in cold environments are water loss through the respiratory system and increased sweating**. Low air temperatures intensify metabolic processes, thereby increasing cold-induced diuresis.

Research on the amount of water loss through the respiratory system has shown **that the lower the air temperature, the greater the loss in the form of vapor.** In the same activity cycle of 8 hours of rest, 12 hours of light or moderate physical work, and 4 hours of intense but variable ambient temperature work, water loss was 680 ml (+25 degrees Celsius), 905 ml (0 degrees Celsius), and 1020 ml (-20 degrees Celsius). Studies have also shown that **additional burdens can exacerbate water loss**, which can lead to **dehydration** and the development of disorders similar to those in hot environments. People in cold environments **do not feel a clear thirst despite increased water needs.**

**Proteins, Fats, and Carbohydrates in Cold Climate**

During prolonged exposure to cold, **catabolic processes intensify**, leading to an **increased demand for protein, carbohydrates, and fats**. Studies have shown that the **proportion of macronutrients remains unchanged** and is the same as in temperate, tropical, and arctic climates. **In cases of limited access to proper clothing and exceptional exposure to chilling, carbohydrate burning increases, and fat metabolism reactions are inhibited.**