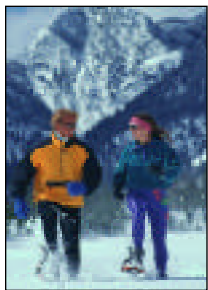


Feature



THINK LAYERS WHEN DRESSING FOR EXERCISE IN THE COLD

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Whether or not you get cold during outdoor activities de-

pends on certain factors including environmental conditions, how much heat your body produces, and whether your body conserves or loses that heat. Humans have two primary physiological responses to cold: vasoconstriction and shivering. Vasoconstriction decreases blood flow to the skin, reducing the rate of heat loss. Shivering increases body heat production. Although these mechanisms maintain body temperature during brief, mild cold exposure, humans really depend on "behavioral thermoregulation," such as shelter, clothing and physical activity, to stay warm. By wearing clothing with appropriate insulation and wind protection, and by generating heat through physical activity, people can continue to exercise throughout the coldest months of the year.

Stay dry, stay warm

There are two important concepts to keep in mind when dressing for winter activities: layering and staying dry. Multiple layers of clothing allow adjustments for various environmental conditions and activity levels. For example, during strenuous activity, a single, thin layer of clothing may provide sufficient insulation, even in very cold weather. However, when exercise ceases, the decreased heat production and continued increased blood flow to the muscles and skin will hasten body cooling, requiring additional clothing layers for both insulation and wind protection.

An effective cold-weather clothing system can be designed using only three layers. A thin inner layer acts to wick moisture away from the skin, reducing evaporative heat loss. The primary insulation is provided by the middle layer, which also transfers moisture to the outer shell. A windproof and waterproof outer shell made of breathable material provides protection from wind

and rain while allowing moisture to escape.

The goal of a cold-weather clothing system is to create a "microenvironment" that conserves heat while providing adequate ventilation to prevent moisture accumulation. Its function depends on using fabrics that insulate well and do not readily absorb moisture. How well a material insulates relates to how much air is trapped within the fibers; for two fabrics that weigh the same, the thicker one will insulate better. Whether the material absorbs or transfers water is especially important, because wet clothing greatly reduces insulation. Because cotton and wool readily absorb moisture and become heavy and bulky when wet, they are poor choices for winter activities. Polyester and polypropylene fabrics are lightweight, do not readily absorb moisture, and wick sweat away from the skin to allow it to be evaporated from the outermost clothing layer. These fabrics are more appropriate for cold-weather clothing.

Although outer-shell garments may be made of materials described as "breathable," meaning they allow water vapor to pass through them, sweating can easily exceed the vapor transfer rate, resulting in the accumulation of moisture on the inside. For this reason, outer shells should not be worn during exercise unless it is raining, and should be designed with substantial venting, such as zippers in the armpit area. Maintaining dry clothing becomes more important the longer you are exposed to cold. For a mountaineer, wet clothing can lead to life-threatening hypothermia, but for a jogger who will return shortly to a hot shower, sweaty clothes may not be a problem.

Consider this

The same clothing principle (use layers and stay dry) apply to gloves, socks and hats, although there are some additional

considerations for proper protection in cold weather. Wearing a thin liner glove protects against contact frostbite, which can occur when bare hands touch cold objects, such as metal or stone. Care should be taken not to wear thick socks that may cause boots to fit too snugly and constrict blood flow. Also, even breathable footwear rarely keeps the feet dry, particularly when exercise increases foot perspiration. For prolonged outdoor activities, it may be necessary to change socks periodically. Finally, windblock fleece is an ideal material for hats or headbands, because it allows moisture evaporation while preventing wind penetration. Hats and gloves are good options for fine-tuning the amount of insulation required as body heat balance changes; they can easily be stowed in a pocket when not needed.

The Wind Chill Index is a valuable guide for alerting people to the increased cooling effect of wind versus air temperature alone. As the wind chill temperature falls, insulation and wind protection must be increased to protect against hypothermia. When the ambient air temperature falls below freezing, exposed skin will become more susceptible to frostbite, and precautions should be taken to protect skin from exposure. Sports participants in mountainous areas, such as skiers, are particularly susceptible to frostbite, because of increased wind speed at higher elevations and the additional effective wind created as they ski downhill. Facemasks and goggles are important protection in these sports.

Winter is a great time to be outside, and with proper clothing, there's no reason to be cold!

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