
FIS Medical Committee Educational Series

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Competitions & Cold

Until recently, little consideration was given in snowsport competitions to the potentially damaging effects of low temperature or of wind chill. As well as wind chill, recent developments in equipment and clothing, and new techniques that improve the speeds attained in competition may exacerbate the effects of cold.

A wind of 5m/sec (18km/hr) causes effective reduction of the ambient temperature from 0degC to -8degC; one of 15m/sec (54km/hr) will effectively reduce it from 0degC to -18degC. This is the 'Wind Chill' effect.

Major cold injuries include hypothermia and direct cold damage to the exposed areas of the body.

Hypothermia

This happens when the core temperature of the body drops as a result of exposure to cold. Shivering is the first noticeable response to a drop in body temperature (at this point heat loss is already exceeding heat production), later followed by a slowing of the pulse and respiration and a decline in level of consciousness, leading eventually to coma and death.

Full details of the methods used to re-warm hypothermic individuals are given in the attached article*, but in general the advice is to re-warm *gently* so that the temperature is allowed to return to normal gradually.

Remember that children are more susceptible than adults to the effects of cold, as they have a relatively large surface area leading to more rapid loss of heat from the body.

Frostbite

The peripheral parts of the body (fingers, toes), as well as the nose and cheeks, are most susceptible to direct cold injury, leading to the condition known as frostbite – the skin is initially pale, cold and numb followed by redness, swelling and pain as re-heating takes place. In severe cases numbness persists, and blisters appear over deeper areas of tissue necrosis; these gangrenous areas may require excision. Once again, it is important that re-warming should be gentle and gradual.

Other problems caused by low temperatures

Cold air may provoke exercise-induced asthma, and upper respiratory infections and bronchitis are common complications in athletes training in cold conditions.

Recommendations

Full consideration should be given to the potential damage that may be done by cold during a competition.

Adequate and appropriate clothing should be worn; it should have sufficient insulation, with an outer windproof layer if necessary. Cold injury to the eye is common, and eyes and face should be protected. Training periods should be shorter when the temperature is low.

Event organisers should be prepared to adjust the programme or cancel if the risk of cold damage to competitors is significant.

Recommended minimum temperature limits

Long distance cross-country races (>30km)	-16degC
Shorter distance races (<30km)	-18degC
Sprint races	-20degC
Temperature limits for children under age	-14-12degC

High speed competitions**

-20degC (**Alpine, Speed skiing, Ski Jumping – short exposure, but increased wind chill effect)

The wind chill effect must always be calculated and taken into consideration. A diagram for this calculation is included in the full article 'Sport at low temperatures - Prevention of cold injuries in snow sports'.