

8.1.3 Heat and Humidity

As your athletes get older and their fitness requirements increase, your ski program will extend further into the summer months. Knowing how to exercise safely during that period should therefore become an important part of the knowledge base of coaches working with cross- country ski programs for athletes in the Learning to Train stage and older.

The information contained in this section will help you implement training and competition practices that will reduce the risk of injuries related to heat and humidity.

The Challenge of Exercising in the Heat

- During exercise, the muscles produce heat. This heat must be dissipated or the body runs the risk of overheating. Overheating can result in serious, potentially life-threatening injuries.
- Sweating is one of the heat-dissipating mechanisms of the body. When sweat evaporates, it cools off the body.
- Most sport activities lead to heat production and sweating. Evaporation of sweat works best when the air is dry. In moist, damp air, sweat cannot evaporate easily, and cooling off is harder.
- If the air temperature is high during vigorous activity, athletes can lose a significant amount of water through sweating.
- High temperatures and high relative humidity make it hard for the body to dissipate heat; heavy sweating occurs, but the water loss does not help cool off the body. Under these conditions, athletes run the risk of overheating.
- Water loss as a result of heavy sweating can lead to dehydration. Dehydration can reduce performance, decrease the body's ability to dissipate heat and endanger health.
- During exercise in the heat, adequate hydration is a must. Athletes must drink water whenever the risk of dehydration is present.
- Thirst is not a good indicator of a need for water. In fact, dehydration has already started if an athlete feels thirsty.
- In most exercise conditions, the rate at which athletes lose water exceeds the rate at which they can absorb it by drinking. Exercise in a hot environment accentuates this.
- Athletes therefore need to drink fluids before they are thirsty.
- Because their sweating mechanism is not fully developed, children run a higher risk of overheating when exercising in the heat. In addition, children tend to not drink enough during exercise, especially if the drink is not flavoured.

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Steps to Take to Avoid Heat Injuries

- ❑ Give athletes enough time to get used to the environment they will face in competition.
- ❑ Insisting on heat acclimatization may mean not entering competitions or adjusting duration and intensity of training if athletes cannot train in a similar climate for approximately two weeks beforehand.
- ❑ To protect athletes (especially young children) from the potentially harmful effects of ultraviolet (UV) rays, have them do the following:
 - ✓ Wear clothes that cover the upper part of the body, the neck, the arms and the legs.
 - ✓ Use sun screen lotion (protection factor of 30 or more) on exposed skin, including the face and hands.
 - ✓ Avoid exposing their body to the sun without effective protection when the UV index is high.
 - ✓ If possible, train in the shade.
- ❑ Before exercise, athletes should drink 400 to 600 ml of fluid.
- ❑ During exercise, athletes should drink 150 to 250 ml of fluid every 15 minutes. Remind athletes to drink, lead by example, and never restrict athletes from drinking during a practice or competition.
- ❑ After exercise, athletes should re-hydrate by drinking as much fluid as thirst dictates; athletes may have to force themselves to drink.
- ❑ Beverages should be cool (8° to 10°C) and not excessively sweet (children prefer flavoured sport drinks, and using them encourages children to drink).
- ❑ Tell athletes to bring a personal water bottle with cold fluids to each practice or competition; inform parents about the importance of hydration; make sure each bottle is clean and well identified.
- ❑ Tell athletes to monitor their hydration level by checking their urine. If it is dark, if there is not much of it, and if it has a strong smell, athletes are probably dehydrated and should force themselves to drink.

Note: Pay particular attention to these steps during the first few hot days of spring or summer, when athletes are not yet acclimated to hot and humid weather.

The Humidex

- ❑ The humidex is a useful guide to assessing the risk of exercising in hot and humid conditions.
- ❑ The humidex describes how hot and humid weather feels to the average person.
- ❑ The humidex combines the temperature and humidity into one number to reflect the perceived temperature.
- ❑ Because it takes into account both heat and humidity, the humidex provides useful information about the risks of exercising in the heat.
- ❑ The table below shows the humidex value for various air temperatures and levels of relative humidity. For instance, if the air temperature is 25°C and the relative humidity is 70%, the humidex is 32°C. This means that the sensation of heat when it is 25°C and the relative humidity is 70% is about the same as when it is 32°C and the air is dry (20% relative humidity).

← Relative Humidity (%) →

	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
20						20	20	21	22	22	23	24	24	25	25	26	27	27
21						21	22	22	23	24	24	25	26	26	27	28	29	29
22					22	22	23	24	25	25	26	27	27	28	29	30	30	31
23					23	24	24	25	26	27	28	28	29	30	31	31	32	33
24					24	25	26	27	28	28	29	30	31	32	33	33	34	35
25				25	26	26	27	28	29	30	31	32	33	33	34	35	36	37
26				26	27	28	29	30	31	32	33	33	34	35	36	37	38	39
27				27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
28			28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
29			29	30	31	32	33	35	36	37	38	39	40	41	42	43	45	46
30			30	31	33	34	35	36	37	39	40	41	42	43	44	46	47	48
31			32	33	34	35	37	38	39	40	42	43	44	45	47	48	49	50
32		32	33	34	36	37	38	40	41	42	44	45	46	48	49	50	51	53
33		33	34	36	37	39	40	41	43	44	46	47	48	50	51	53	54	55
34		34	36	37	39	40	42	43	45	46	48	49	51	52	53	55	56	58
35		36	37	39	40	42	43	45	47	48	50	51	53	54	56	57	59	
36		37	39	40	42	44	45	47	49	50	52	53	55	57	58	60		
37	37	38	40	42	44	45	47	49	51	52	54	56	58	59				
38	38	40	42	43	45	47	49	51	53	54	56	58	60					
39	39	41	43	45	47	49	51	53	55	57	59							
40	41	43	45	47	49	51	53	55	57	59								

Guidelines for Exercising at Different Humidex Values

The guidelines below are provided for a heat-acclimated, well-hydrated person. If the humidex is above 30°C, and especially if it exceeds 35°C:

- Tell athletes to bring extra water or sport drinks, ensure there will be access to water during the practice or competition, and bring a big jug of fluids.
- Tell athletes to dress in loosely fitting, lightweight, light-coloured clothes.
- Plan for low-intensity activities.
- Plan for shorter work bouts, with frequent and longer pauses.

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- Schedule practices early in the morning or during the evening; avoid the hours between 10 AM and 6 PM.
- Consider changing the location of the practice to a shaded area, or ask athletes to bring umbrellas to create shade during breaks.
- Consider exercising indoors, in a facility with air conditioning.
- Consider alternatives to physical exercise.

Humidex Value	Discomfort at Rest	Risk of Overheating During Exercise
Below 24°C	None	Low to moderate
25 to 29°C	None	Moderate
30 to 39°C	Some	High – Children should be monitored closely
40 to 45°C	Great	Very high – Exercise is not advised for children, older people, or individuals with a poor fitness level
Above 45°C	Great risk of overheating even at rest	Extreme – Exercise is not advised for any athlete

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8.1.8 Eye Protection

The depletion of the ozone layer has become a serious problem for the health and welfare of the world's population. As the ozone layer depletes, we are becoming more and more exposed to harmful ultraviolet (UV) radiation. This affects all parts of our bodies, including our eyes.

Some Facts About UV Radiation

- Reflections off the surface of the earth increase the effect of UV. Earth and grass reflect 5%, sand 17%, water 20% and snow 85%.
- Clouds and haze may actually increase the amount of radiation reaching the ground
 - although dark clouds may reduce it.
- UV radiation is almost 17 times worse in the winter and spring months than it is in the summer months.
- At noon, the amount of radiation is greater than it is at other times of the day.
- Altitude increases radiation. There is a 16% increase to every 1000 metres above sea level.

To protect your athletes from the potentially harmful effects of ultraviolet rays:

- Wear a hat or cap with a visor.
- Wear eyewear with UV protection when participating in outdoor sports, and particularly in winter sports. You may wish to use polarized lenses as they remove reflections off the snow and impact resistant.