

# Safetygram

NCI-Frederick

ISM-148

General

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## Heat Stress

The effects of heat stress can range from transient heat fatigue to serious illness and even death. Heat stress is caused by a number of interacting factors, including environmental conditions (such as high temperatures and/or high humidity), clothing, workload, and the individual characteristics of the worker. A previous heat injury (including sunburn) can also affect an individual's susceptibility to further heat injury. Workers who have suffered a previous heat injury, or who have sunburn, must be especially vigilant in preventing heat strain and injury.

Overexposure to ultraviolet radiation (UVA or UVB) may damage the skin and cause sunburn. Sunburn increases an individual's susceptibility to other forms of heat stress. Any worker with sunburn must pay extra attention to the prevention of heat cramps, heat exhaustion, and/or heat stroke. Chronic exposure to sunlight, especially the UV-B component, accelerates skin aging and increases the risk of skin cancer. Fair-skinned individuals are very prone to this effect; increased skin pigmentation reduces the skin sensitivity by as much as a factor of 10.

### Heat Injury Prevention

These are a few guidelines you should follow in trying to prevent heat strain:

- Stay in good physical condition.
- Follow an appropriate work-rest schedule.
- Drink plenty of liquids, including electrolyte drinks, when necessary. In addition, avoid alcohol the night before working in a suspected hot environment and avoid caffeinated beverages during the workshift.
- Avoid heavy foods prior to and during work shifts. Heavy foods, especially in large quantities and that contain salt, may tax the body's cooling system.
- Wear lightweight, light colored clothing when working in the sun.
- Take advantage of fans and air-conditioners when available.
- Get the recommended 8 hours of sleep at night.
- Allow the body to acclimate to warm environments before starting work involving physical activity. Do not begin work with extremely demanding activities.
- Remove impermeable garments during rest periods.
- All breaks should be taken in a protected rest area out of direct sunlight. A shaded tree would be a good example.
- Watch other co-workers closely for signs and symptoms of heat strain or injury.
- Some medications may make you more vulnerable to heat stress injuries. Contact OHS (x1096) or your personal physician if you are taking medication and will be working in a hot environment.

- If you notice that your pulse rate is over 100 beats per minute while working in a hot environment, take an immediate rest break in a cool area.

### Sunburn/UV Exposure Prevention

When possible, the following methods should be used to avoid overexposure to UV rays from the sun:

Avoid exposure to the sun between 10:00 a.m. and 2:00 p.m.

- Wear protective clothing that provides the most coverage, consistent with the job to be performed.
- Protect eyes during sun exposure with UV-absorbing sunglasses or tinted safety glasses.
- Use a commercial sunscreen, preferably with a skin protection factor (SPF) of 15 or greater. Sunscreen should be applied 15 to 30 minutes before exposure to the sun and reapplied every 60 to 90 minutes. It is best to use a sunscreen that claims to protect against both UV-B and UV-A rays.
- If sunburn occurs, apply cool compress to area. Also, apply aloe vera lotion to sunburned area.

### Heat Injury Treatment

The following are general guidelines to be followed for heat stress treatment. For explanations of heat strain injuries and their treatments, refer to Table 1 on the following page.

- Eat foods that contain salt and consume salted drinking water;
- Remove worker to cool shaded area for rest;
- Loosen clothing and remove PPE;
- Lay worker down with head low;
- Apply cool compress to individual's face, to help bring body temp under 38°C. (100.4F°)
- Provide cool fluids (one cup of water every 20 minutes); and
- Monitor vital signs and seek medical help, if vital signs worsen.

EHS utilizes the Metrologger by Metrosonics hs.3700 Heat Stress Data Logger. Heat stress values are calculated using the same equations:

WB=Wet Bulb Globe Temperature Index  
 NWB=Natural Wet-Bulb Temperature  
 DB=Dry-Bulb Temperature  
 GT=Globe Temperature

1. Outdoors with solar load:  

$$WBGT=0.7NWB+0.2GT+0.1DB$$
2. Indoors or outdoors with no solar load:  

$$WBGT=0.7NWB+0.3GT$$

Table 1: Heat Injuries and Illnesses

Heat Injury/Illness	Cause	Signs/Symptoms	Treatment
Heat rash or prickly	<ul style="list-style-type: none"> <li>• Skin remains moist for long periods of time</li> <li>• Plugged sweat ducts</li> </ul>	<ul style="list-style-type: none"> <li>• Skin rash</li> <li>• Tingling or prickling sensation</li> </ul>	<p>Move worker to a cool shaded area.</p> <p>If possible, the affected individual should take a shower, dry skin thoroughly, and change undergarments as needed.</p> <p>Most cases of heat rash will disappear when the affected individual returns to a cool environment.</p>
Heat cramps/heat tetany	<ul style="list-style-type: none"> <li>• Heavy sweating</li> <li>• Inadequate electrolyte (salt) replacement</li> </ul>	<ul style="list-style-type: none"> <li>• Muscle spasms and pain in the hands, feet, and abdomen</li> </ul>	<p>Move worker to a cool shaded area for rest.</p> <p>Provide fluid replacement.</p>
Heat exhaustion/heat fatigue	<ul style="list-style-type: none"> <li>• Dehydration</li> <li>• Inadequate blood circulation</li> <li>• Stress on body organs</li> </ul>	<ul style="list-style-type: none"> <li>• Pale, cool, moist skin</li> <li>• Heavy sweating</li> <li>• Dizziness, nausea</li> <li>• Fainting</li> </ul>	<p>Move worker to a cool shaded area for rest.</p> <p>Provide fluid replacement.</p>
Heat Stroke (Serious Medical Emergency)	<ul style="list-style-type: none"> <li>• Failure of body's temperature regulation system</li> <li>• High body temperature</li> </ul>	<ul style="list-style-type: none"> <li>• Hot, dry skin</li> <li>• Lack of, or reduced, perspiration</li> <li>• Nausea</li> <li>• Dizziness and confusion</li> <li>• Strong, rapid pulse (initially)</li> <li>• Coma</li> <li>• Death</li> </ul>	<p>If a worker shows signs of possible heat stroke, call 911 immediately.</p> <p>Place worker in a cool shaded area and remove outer clothing.</p> <p>Wet the worker's skin and, if possible, increase the air movement around the worker.</p> <p>Provide fluid replacement.</p>