



WESTERN
KENTUCKY
UNIVERSITY

Environmental Health & Safety

**HEAT STRESS
PROGRAM
2007**

Heat Stress

During hot summer days, we sweat, and often complain about being exhausted "just from the heat". This discomfort reflects a process that the human body is using to keep its core temperature at a safe level. The body is like a machine, and as every machine creates heat when it uses energy to run, so too does the human body. The body generates heat when it runs its inner metabolic processes. Heat is also supplied by the outside environment as hot and humid weather, by hot objects (like furnaces) or hot places (like being inside a chemical suit or firefighter's turnout gear). There are times and situations when heat is not just a discomfort, but dangerous.

What is too hot?

Just checking the thermometer is not an accurate measure of potential heat hazards. A number of factors work together to make heat in the workplace a hazard. These include humidity, air temperature, air movement and radiant heat. Additional factors to consider are the physical condition of workers, work load and pace, and worker acclimatization to heat. Common sense will tell you that working moderately in a well-ventilated setting, with low humidity at 80 degrees is very different from working in the same temperature with high humidity and a heavier work load.

Administrative Controls

The following administrative controls can be used to reduce heat stress:

- Reduce the physical demands of work, e.g., excessive lifting or digging with heavy objects;
- Provide recovery areas, e.g., air-conditioned enclosures and rooms;
- Use shifts, e.g., early morning, cool part of the day, or night work;
- Use intermittent rest periods with water breaks;
- Use relief workers;
- Use worker pacing; and
- Assign extra workers and limit worker occupancy, or the number of workers present, especially in confined or enclosed spaces.

How heat affects the body

The body's internal core temp must be maintained within a fairly rigid range of temperature. This core temperature is 99.5 degrees, plus or minus 1.8 degrees. Determined to maintain that core temperature, the body strives to strike a balance between the amount of heat produced internally and the amount of heat lost (or gained) to the outside environment. This is done largely through sweat. As sweat evaporates, it takes heat with it. Work harder and the body will crank up the heat exchange system: you sweat more. The internal core temperature stays within safe ranges as long as this heat/cooling mechanism functions properly. But, if it is very hot or humid, if work is near a furnace or other heat source, or workers wear chemical protective clothing, the mechanism of heat exchange can be altered dramatically. When this happens you can get sick.

Heat Stroke

Heat stroke results when your body's cooling system breaks down under stress and sweating stops. A heat stroke victim's skin is hot, dry and usually red or spotted. Body temperature is 105 degrees or higher. The worker may be mentally confused, irritable and complain of feeling chilled. If the person is not removed from the heat and cooled down, severe symptoms will appear, such as unconsciousness or convulsions. Death may result. In three out of four heat stroke fatalities, the victims had left the job site and were on their way home when they collapsed.

Treatment for heat stroke: remove from heat, soak clothes thoroughly with water and fan the body to increase cooling.

Heat Exhaustion

The signs and symptoms of heat exhaustion are headache, nausea, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment. Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment and given fluid replacement. They should also be encouraged to get adequate rest.

Heat Cramps

Heat cramps are usually caused by performing hard physical labor in a hot environment. They are muscular spasms that occur when the body loses too much salt during profuse sweating and not enough salt is taken in. With too much water and not enough salt, electrolyte imbalance takes place and the already stressed muscles are further affected. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Recent studies have shown that drinking commercially available carbohydrate-electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

Heat Collapse ("Fainting")

In heat collapse, the brain does not receive enough oxygen because blood pools in the extremities. As a result, the exposed individual may lose consciousness. This reaction is similar to that of heat exhaustion and does not affect the body's heat balance. However,

the onset of heat collapse is rapid and unpredictable. To prevent heat collapse, the worker should gradually become acclimatized to the hot environment.

Heat Rashes

Heat rashes are the most common problem in hot work environments. Prickly heat is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

Heat Fatigue

Heat fatigue resulting from prolonged heat exposure, causes a decline in coordination, alertness, and performance. With so much blood going to the periphery of the body, less is available for muscles. Strength drops and fatigue kicks in sooner than otherwise. Accidents are more likely to happen. For example, accident rates for heavy machine operators double when they work in hot environments.

Heat Stress Information Reference

<http://www.osha.gov/Publications/osha3154.pdf>