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# SAFETY NEWSLETTER

## TOPIC: PROTECTING WORKERS IN HOT ENVIRONMENTS

Many workers spend some part of their working day in a hot environment. Problems associated with heat stress can include discomfort that interferes with productivity, an increased risk of injuries because of accidents caused by slippery palms, fogged up safety glasses, and dizziness, or life threatening medical emergencies. Many of the steps employees take to beat the heat involve common sense. **However, training workers in how to recognize the symptoms of heat distress (i.e., heat stroke, heat exhaustion, heat cramps, fainting and heat rash) and on what to do to prevent these disorders should be reviewed each year.**

### HEAT STRESS CAUSES BODY REACTIONS

Four environmental factors affect the amount of stress a worker faces in a hot work area: temperature, humidity, radiant heat (such as from the sun or a furnace) and air velocity. Perhaps most important to the level of stress an individual faces are personal characteristics such as age, weight, fitness, medical condition and acclimatization to the heat. **Drinking alcoholic or caffeinated beverages and taking certain medications will also increase your risk of heat stress.**

The body reacts to high external temperature by circulating blood to the skin which increases skin temperature and allows the body to give off its excess heat through the skin. However, if the muscles are being used for physical labor, less blood is available to flow to the skin and release the heat.

Sweating is another means the body uses to maintain a stable internal body temperature in the face of heat. However, sweating is effective only if the humidity level is low enough to permit evaporation and if the fluids and salts lost are adequately replaced.

Of course there are many steps a person might choose to take to reduce the risk of heat stress, such as moving to a cooler place, reducing the work pace or load, or removing or loosening some clothing. But the body cannot dispose of excess heat, it will store it. When this happens, the body's core temperature rises and the heart rate increases. As the body continues to store heat, the individual begins to lose concentration and has difficulty focusing on a task, may become irritable or sick and often loses the desire to drink. The next stage is most often fainting and death is possible if the person is not removed from the heat stress.

### HEAT DISORDERS

#### *Heat Stroke*

Heat stroke is the most serious of health problems associated with working in hot environments. It occurs when the body's temperature regulatory system fails and sweating becomes inadequate. The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached.

A heat stroke victim's skin is hot, usually dry, red or spotted. Body temperature is usually 105°F or higher, and the victim is mentally confused, delirious, perhaps in convulsions, or unconscious. Unless the victim receives quick and appropriate treatment, death can occur.

Any person with signs or symptoms of heat stroke requires immediate hospitalization. However, first aid should be immediately administered. This includes removing the victim to a cool area, thoroughly soaking the clothing with water, and vigorously fanning the body to increase cooling. Further treatment at a medical facility should be directed to the continuation of the cooling process and the

monitoring of complications which often accompany the heat stroke. Early recognition and treatment of heat stroke are the only means of preventing permanent brain damage or death.

### ***Heat Exhaustion***

Heat exhaustion includes several clinical disorders having symptoms which may resemble the early symptoms of heat stroke. Heat exhaustion is caused by the loss of large amounts of fluid by sweating, sometimes with excessive loss of salt. A worker suffering from heat exhaustion still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. In more serious cases, the victim may vomit or lose consciousness. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature is normal or only slightly elevated.

In most cases, treatment involves having the victim rest in a cool place and drink plenty of liquids. Victims with mild cases of heat exhaustion usually recover spontaneously with this treatment. Those with severe cases may require extended care for several days. There are no known permanent effects. (Persons with heart problems or those on a low sodium diet who work in hot environments should consult a physician about what to do under these conditions.)

### ***Heat Cramps***

Heat cramps are painful spasms of the muscles that occur among those who sweat profusely in heat, drink large quantities of water, but do not adequately replace the body's salt loss. The drinking of large quantities of water tends to dilute the body's fluids, while the body continues to lose salt. Shortly thereafter, the low salt level in the muscles causes painful cramps. The affected muscles may be part of the arms, legs, or abdomen, but tired muscles (those used in performing the work) are usually the ones most susceptible to cramps. Cramps may occur during or after work hours and may be relieved by taking liquids by mouth or saline solutions intravenously for quicker relief, if medically determined to be required. **(Salt tablets should not be used. The average american diet contains sufficient salt for acclimatized workers even when sweat production is high. If, for some reason, salt replacement is required, the best way to compensate for the loss is to add a little extra salt to the food.)**

### ***Fainting***

A worker who is not accustomed to hot environments and who stands erect and immobile in the heat may faint. With enlarged blood vessels in the skin and in the lower part of the body due to the body's attempts to control internal temperature, blood may pool there rather than return to the heart to be pumped to the brain. Upon lying down, the worker should soon recover. By moving around, and thereby preventing blood from pooling, the patient can prevent further fainting.

### ***Heat Rash***

Heat rash, also known as prickly heat, is likely to occur in hot, humid environments where sweat is not easily removed from the surface of the skin by evaporation and the skin remains wet most of the time. The sweat ducts become plugged, and a skin rash soon appears. When the rash is extensive or when it is complicated by infection, prickly heat can be very uncomfortable and may reduce a worker's performance. The worker can prevent this condition by resting in a cool place part of each day and by regularly bathing and drying the skin.

### ***Transient Heat Fatigue***

Transient heat fatigue refers to the temporary state of discomfort and mental or psychological strain arising from prolonged heat exposure. Workers unaccustomed to the heat are particularly susceptible and can suffer, to varying degrees, a decline in task performance, coordination, alertness, and vigilance. The severity of transient heat fatigue will be lessened by a period of gradual adjustment to the hot environment (heat acclimatization).

## **PREVENTING HEAT STRESS**

Most heat-related health problems can be prevented or the risk of developing them reduced. Following a few basic precautions should lessen heat stress.

1. A variety of **engineering controls** including general ventilation and spot cooling by local exhaust ventilation at points of high heat production may be helpful. Shielding is required by the Occupational Safety and Health Administration (OSHA) as protection from radiant heat sources. Evaporative cooling and mechanical refrigeration are other ways to reduce heat. Cooling fans or air-conditioned enclosures or rooms can also reduce heat in hot conditions. Eliminating steam leaks will also help. Equipment modifications, the use of power tools to reduce manual labor and personal cooling devices or protective clothing are other ways to reduce the hazards of heat exposure for workers.
2. **Work practices** such as providing plenty of drinking water - as much as a quart per worker per hour, or 8 ounces every 15 minutes can help reduce the risk of heat disorders. (Drinking small amounts frequently is best.) Wearing cotton clothing, wetted clothing, rotating employees, scheduling hot jobs for the cooler part of the day are other work practices that may reduce heat stress.
3. Alternating **work and rest periods** with rest periods in a cool or shaded area can help workers avoid heat stress. Individual work periods should not be lengthened in favor of prolonged rest periods. Shorter, but frequent work-rest cycles are the greatest benefit to the worker. If possible, heavy work should be scheduled during the cooler parts of the day and appropriate protective clothing provided. Supervisors should be trained to detect early signs of heat stress and should permit workers to interrupt their work if they are extremely uncomfortable.
4. **Acclimatization** to the heat through short exposures followed by longer periods of work in the hot environment can reduce heat stress. New employees and workers returning from an absence of two weeks or more should have a 5-day period of acclimatization. This period should begin with 50 percent of the normal workload and time exposure the first day and gradually building up to 100 percent on the fifth day.
5. **Employee education** is vital so that workers are aware of the need to replace fluids and salt lost through sweat and can recognize dehydration, exhaustion, fainting, heat cramps, salt deficiency, heat exhaustion, and heat stroke as heat disorders. **Remind employees to drink fluids regularly even if they are not thirsty.** Daily fluid intake must be sufficient to prevent significant weight loss during the workday and over the workweek.

Many of us are not dealing with a hot work environment and may not need to implement all of these controls and practices. However, anyone can suffer from a heat-related illness. Therefore, we all need to be aware of the warning signs and how to prevent heat-related illnesses:

staying cool (using air conditioners, cool showers, etc),

making simple changes in your fluid intake (drink more liquids that do not contain alcohol, caffeine or large amounts of sugar),

regulating activities (staying indoors, or limit outdoor activity to mornings and evenings, and rest in shady areas),

and proper clothing (lightweight, loose and light-colored clothing, wide-brimmed hats, sunscreen and sunglasses) during hot weather can help you and your family remain safe and healthy.