Heat Stress

Heat is a common discomfort when working outside on a hot day or in areas where the equipment being used creates heat. This heat can have a negative effect on your health if you are not prepared. This Toolbox will help you recognize the physical symptoms created by heat stress and how to prevent heat related illness.

How The Body Copes With Heat?

The body reacts to high body 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. But if 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 liquids which is critical. The next stage is most often fainting. Death is possible if the person is not removed from the heat stress.

Factors That Create Heat Related Injuries

Environment

The environment that you work in can have factors that lead to heat stress. The environment can affect you by increasing your body's core temperature.

Temperature – Of course the temperature of the work environment can be a major cause of heat related disorders, but not the only cause.

Humidity – Can cause discomfort and even delay the evaporation of sweat off of the skin slowing natural cooling.

Air Movement– Moving air can aid the evaporation of sweat.

Radiant Heat – Can come from the sun or equipment but starts affecting the body once its temperature is greater than your body temperature.

Personal Characteristics

Each person is different, so each person handles heat a little differently. Below is a list of characteristics that could lead to an increased risk to heat related illness.

- Age
- Weight
- Fitness Level
- Acclimatization to Heat
- Medications
- Medical Conditions

Heat Related Illness

Heat cramps painful spasms of the muscles, are caused when workers drink large quantities of water but fail to replace their bodies' salt loss. Tired muscles -- those used for performing the work -- are usually the ones most susceptible to cramps. Cramps may occur during or after working hours and may be relieved by taking liquids by mouth or saline solutions intravenously for quicker relief, if medically determined to be required. To replace salts in the body, a Sports Drink is an effective solution.

Heat exhaustion results from loss of fluid through sweating when a worker has failed to drink enough fluids, or take in enough salt, or both. The worker with heat exhaustion still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. The skin is clammy and moist, the complexion pale or flushed, and the body temperature normal or slightly higher. Treatment is usually simple: the victim should rest in a cool place and drink an electrolyte solution (a beverage used by athletes to quickly restore potassium, calcium, and magnesium salts.) Severe cases involving victims who vomit or lose consciousness may require longer treatment under medical supervision.

Heat stroke the most serious health problem for workers in hot environments, is caused by the inability of the body's internal mechanism to regulate its core temperature. Sweating stops and the body can no longer rid itself of excess heat. Signs include (1) mental confusion, loss of consciousness, convulsions or coma; (2) a body temperature of 106 degrees F or higher; and (3) hot dry skin which may be red, mottled, or bluish. Victims of heat stroke will die unless treated promptly. While awaiting medical help, the victim must be removed to a cool area and his/her clothing soaked with cool water. He/She should be fanned vigorously to increase cooling. Prompt first aid can prevent permanent injury to the brain and other vital organs. **(Source OSHA: Fact Sheet: Protecting Workers From Hot Environments)**

Emergency Response

The general response to a heat related emergency should be:

- **Cooling the Body** - If possible get yourself or your co-worker to a shady area or a cooler room or environment.
- **Give Fluids –** Drink or give fluids. Sports drinks with electrolytes would be preferred to replace important salts.
- **Treat Shock** – If you have first-aid training, treat the person for shock, only do this if you are properly trained.

For heat cramps or heat exhaustion: Get the person to a cooler place and have him or her rest in a comfortable position. If the person is fully awake and alert, give a half glass of cool water every 15 minutes. Do not let him or her drink too quickly. Do not give liquids with alcohol or caffeine in them, as they can make conditions worse. Remove or loosen tight clothing and apply cool, wet cloths such as towels or wet sheets. Call 9-1-1 or the local emergency number if the person refuses water, vomits or loses consciousness.

For heat stroke: Heat stroke is a life-threatening situation! Help is needed fast. Call 9-1-1 or your local EMS number. Move the person to a cooler place. Quickly cool the body. Wrap wet sheets around the body and fan it. If you have ice packs or cold packs, wrap them in a cloth and place them on each of the victim's wrists and ankles, in the armpits and on the neck to cool the large blood vessels. (Do not use rubbing alcohol because it closes the skin's pores and prevents heat loss.) Watch for signals of breathing problems. Make sure the airway is clear. Keep the person lying down. (Source: American Red Cross)

Preventing Heat Stress

Engineering Controls – Your employer may use a variety of protection from heat including: Ventilation, Cooling Rooms, Heat Shields, Shaded Break Areas, Cooling Fans, or even Personal Cooling Devices. It is important to use these features or equipment to protect yourself from heat illness. Never disable equipment designed to protect you from a hazard.

Work Practices - Change your job to make heat less hazardous. Drink plenty of water, as much as 1 quart an hour. Also make sure that you know the symptoms of heat illnesses (Part I) so that you can identify their onset as soon as possible.

Take Breaks – Sometimes heat dictates taking a little longer break, preferably in a cool area. Make sure to rest during your break to recharge your body's cooling system. When possible schedule the most strenuous work during the coolest parts of the day.

Heat Acclimation - Heat Acclimation is one of the best defenses against heat stress injury and heat related fatalities. Heat Acclimation is achieved by gradually increasing exposure and physical activity in hot environments.

Heat acclimatization occurs when repeated heat exposures are sufficiently stressful to elevate body temperature and provoke profuse sweating. Resting in the heat, with limited physical activity, results in only partial acclimatization. Physical exercise in the heat is required to achieve optimal heat acclimatization for a given hot environment. Workers who only perform light or brief physical work will achieve the level of heat acclimatization needed to perform that task. If they attempt a more strenuous or prolonged task, additional acclimatization and improved physical fitness will be needed.

Complete heat acclimatization requires up to 14 days with a minimum daily heat exposure of about two hours. The benefits of heat acclimatization will be retained for about 1 week and then decay with about 75 percent lost by about 3 weeks, once heat exposure ends. A day or two of intervening cool weather will not interfere with acclimatization to hot weather.

Body Awareness - Being aware of your limitations as well as your own medical history will allow to make decisions that will protect you from the hazards of heat. Your body weight is an indicator of dehydration. At a loss of 1% of body weight you are starting to dehydrate, at 3%-5% drop is moderate dehydration, anything over 5% is serious. Weighing yourself as part of your safety program could prevent serious injuries related to heat.

How You Can Protect Yourself and Others

- Know signs/symptoms of heat illnesses; monitor yourself; use a buddy system.
- Block out direct sun and other heat sources.
- Drink plenty of fluids. Drink often and BEFORE you are thirsty. Drink water every 15 minutes.
- Avoid beverages containing alcohol or caffeine.
- Wear lightweight, light colored, loose fitting clothes (Source OSHA: Quick Card: Protecting Workers From Heat Stress).

For more Information here are references and resources that address heat stress and worker safety and health:

OSHA:

https://www.osha.gov/SLTC/heatstress/heat_illnesses.html

https://www.osha.gov/OshDoc/data_Hurricane_Facts/heat_stress.pdf

https://www.osha.gov/Publications/osha3154.pdf

NIOSH:

http://www.cdc.gov/NIOSH/TOPICS/HEATSTRESS/

http://www.cdc.gov/niosh/docs/2010-114/pdfs/2010-114.pdf

American Red Cross:

http://american.redcross.org/site/PageServer?pagename=ItsHotOutHere