TerranearPMC Safety Share

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Week of July 2, 2018 – Heat Stress Revisited – Again!

This is the time of year when workers are most susceptible to heat-related conditions such as heat rash, heat stress and heat stroke; this last condition being a most severe circumstance and therefore, preventative practices need to be employed. We can begin by asking the question: what is the difference from working in sunny conditions with a temperature of 100° F between Florida and the Mojave Desert? While both locations have the same temperature with the same amount of radiant heat from the sun (we will just make that assumption), the ultimate factor is humidity. Sweating is an important cooling mechanism that help to maintain our body temperature within normal parameters (which is typically at or near 98.6° F). If we cannot sweat, we lose a very vital control mechanism and are therefore subject to having our body temperature rise.

OK, so our temperature rises. So What!? Well, first off, your body, in its attempt to maintain a normal temperature will start to increase your heart rate as a way for blood to reach the extremities and therefore cool off through a heat exchange process. As a way to bring blood to the extremities as soon as possible, blood vessels are dilated and thus allowing more blood through a given cross section through the arteries. However if the outside temperature is greater than one's body temperature (such as 100° F), the "driving force" to have heat from your body migrate to the outside will be ineffective. Nevertheless, your heart will continue to be taxed as it will still try to push blood to the extremities. In addition, if it is very humid, the air is what is referred to as *saturated* and therefore will not be able to allow any additional water/moisture from being absorbed, so the sweat that is being created will not evaporate. So now the two controls that your body would use to regulate body temperature would be rendered ineffective.

However, if you are working in a desert environment, the air is far from being saturated and therefore can readily allow evaporation to take place. Sounds good. Maybe we all should be working in the desert if this means our body's cooling mechanisms can work effectively. There's just one problem. That our body can only store so much water: as a matter of fact if a person loses approximately 2% of their weight due to water loss, experts agree that amount of water will impair performance. Knowing that the body can sweat up to 2 liters/hour (as a method to maintain body temperature), that means a loss of over 4 lbs per hour – IF there is no water replenishment. For some people that could be substantial! The table below presents the potential physiological effects based on the amount of water loss as a percentage of one's body weight.

% body weight lost as sweat	Physiological Effect
2%	Impaired performance
4%	Capacity for muscular work declines
5%	Heat exhaustion
7%	Hallucinations
10%	Circulatory collapse and heat stroke

So in the desert our evaporative cooling mechanism can be very effective, but if we do not replenish our water supply, eventually we will lose too much water and, therefore have no more sweat for evaporative cooling. As shown in the chart above, this can lead to the very serious condition known as heat stroke. And when heat stroke occurs, it is paramount that to get immediate medical help.

Yes, that means calling 911. AND, should the victim be in a contaminated area (chemical or radiological), decontamination becomes a lesser priority. This means that there is a high likelihood of spreading contamination beyond the established work control boundaries and even resulting in contamination of an ambulance or vehicle that will transport the victim to the hospital or medical center. Yes, decontamination will be an expensive process, but by not acting expediently, there is a considerable chance of death.

Heat stroke has a number of symptoms. The most obvious is a person having a seizure. The skin will be very hot and dry (as all moisture has been evaporated) with an internal temperature reaching and even exceeding 105° F. Other symptoms include dizziness and fainting, extreme fatigue, nausea/vomiting, a rapid heart rate and mental confusion. These last symptoms are not as obvious as a seizure, and therefore it is important to be able to recognize these conditions where we see it; especially when noticing them from a coworker as they may not want to admit their condition due to their inability to reason (mental confusion) or just a desire to not be a burden to the team.

Less severe conditions brought on from heat exposure include heat exhaustion, heat cramps, syncope, heat rashes (or prickly heat) and a condition known as rhabdomyolysis.

Symptoms of heat exhaustion include: heavy thirst and sweating, elevated body temperature and a decreased urine output; thus, placing a person in jeopardy of heat stoke if left untreated.

Rhabdomyolysis is a medical condition resulting in the rapid breakdown, rupture, and death of muscle. When muscle tissue dies, electrolytes and large proteins are released into the bloodstream that can cause irregular heart rhythms and seizures, while damaging the kidneys.

Heat syncope is a fainting episode or dizziness that usually occurs with prolonged standing or sudden rising from a sitting or lying position. Factors that may contribute to heat syncope include dehydration and lack of acclimatization.

Heat cramps usually affect workers who sweat a lot during strenuous activity. This sweating depletes the body's salt and moisture levels. Low salt levels in muscles causes painful cramps. Heat cramps may also be a symptom of heat exhaustion.

A less severe health effect from heat exposure is heat rash or prickly heat. This is a skin irritation caused by excessive sweating during hot, humid weather.

Aside from heat related illnesses, heat can also increase the risk of injuries due to poor grips from sweating and poor visibility from fogged-up safety glasses.

Heat exhaustion is the body's response to an excessive loss of the water and salt, usually through excessive sweating. And while workers who are most prone to heat exhaustion are those that are elderly, or have high blood pressure, monitoring our workers and providing water and resting in shaded areas are important preventative measures. Most important – if you feel a heat-related condition coming on, let your coworkers know!

Whatever you do in life, surround yourself with smart people who'll argue with you - John Wooden,