Recognizing Heat Stroke

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Temperature and humidity levels are rising, and our bodies have cooling mechanisms—how do they work and what should we do if they can’t keep up?

As warm-blooded mammals, we humans have an intricate temperature control system that constantly maintains our internal climate within about a five-degree range, even if there are wild fluctuations in the air around us. Many processes occur in concert to keep the body within this range—just above or below 36.8° C (98.2° F)—and these are collectively known as thermoregulation.

It is as if we have internal thermostats. When it’s too hot, our bodies’ air conditioners turn on—we sweat and we turn red as the blood comes to the surface of our skin to dispel heat. And when it’s too cold, the heater kicks in—the blood moves to our core to limit its exposure to cold. As the air becomes extremely hot or cold around us, thermoregulatory processes work in overdrive; and sometimes they can’t keep up. It’s important to keep this in mind as we enter the extremely hot and humid conditions of summer. It is at these times that heat stroke can threaten our health and even life.

Clinically, there are two types of heat stroke. “Classic heat stroke” is common in the very young and very old and occurs when a heat wave descends on an area. “Exertional heat stroke” (EHS) affects otherwise healthy people who exert themselves to the extreme at work or play. To understand the differences between the two types of heat stroke and how they overlap, we must look closer at the mechanisms behind heat stroke in general.

Temperature within the human body must be kept below a maximum point, because when cells are exposed to extreme heat—above 41.1°C (106°F)—they literally start to fall apart. In the most extreme cases, heat causes the denaturing of proteins and the literal melting of structural elements among other breakdowns. All of these microscopic changes lead to cardiovascular collapse, general organ failure, and ultimately, death.

When ambient temperatures rise, the body handles it in a combination of ways. Radiation of heat—releasing heat into the air through the skin—is the main way the body rids itself of heat when temperatures are not extreme. However, when the temperature rises significantly outside, the most important way the body can release heat is through evaporation, better known as sweating.

To stay hydrated and produce sweat, it’s good to drink at least 2.5 liters of water—that’s one plus a fourth of the two-liter soda bottles you see at the store—per day. If you are an active, outdoor worker, add another two liters to that. Add even more if you are working intensely, but avoid drinking too much. Too much water can result in overhydration, a condition where salt concentrations in the body are thrown out of balance.

Classic heat stroke tends to affect infants and the elderly, because they are more fragile in their physiology and are often cared for by others who may not properly gauge their water intake. When exposed to extreme temperature without adequate water consumption, they are unable to dissipate heat. EHS on the other hand occurs when, through excess activity, the body produces heat that it can’t get rid of fast enough. Combine this with heat outside and the body literally starts to cook.

Sometimes, before heat stroke sets in, the body goes through a stage of heat exhaustion. This stage is not quite as dangerous as heat stroke and offers the person or their caretaker a chance to seek medical attention before the
situation gets serious.

Symptoms of heat exhaustion include the following:

- nausea
- vomiting
- fatigue
- weakness
- headache
- muscle cramps
- dizziness

In extremely hot conditions, heat stroke can take over. Sometimes circumstances drive the body directly into heat stroke without the interim phase of heat exhaustion.

Symptoms of heat stroke include the following:

- absence of sweating
- red or flushed skin
- shortness of breath
- rapid pulse
- hallucinations
- confusion
- agitation
- disorientation
- seizure
- coma

If any of these symptoms arise, it’s imperative that the person is moved to a cool place and provided immediate medical attention. In cases of heat stroke, progressively rapid rehydration and a cooler environment will enhance a return to temperature balance.

Resources

- [www.medicinenet.com/heat_stroke/article](http://www.medicinenet.com/heat_stroke/article)

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