How extreme heat affects the body

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The moment you step into oppressive heat, the body senses life-threatening danger and starts fighting to keep things cool.

The heart beats faster as it increases the flow of blood to the skin, trying to keep critical internal organs from overheating. But if your core temperature continues to rise, drastic measures kick in. Sweat starts dripping - then pouring - from your glands so that evaporation can cool the body.

But if humidity leaves the sweat with no place to go and it simply drips off the skin, "your internal temperature will skyrocket," said Matthew Ganio, a researcher at UT Southwestern Medical Center and Texas Health Presbyterian Hospital's Institute for Exercise and Environmental Medicine. "Eventually it could lead to organ damage and death."

Heat waves do more than make us cross and sluggish. Searing temperatures kill more people in the U.S. than hurricanes, lightning, tornadoes, floods and earthquakes combined.

People over the age of 60 are most vulnerable to suffocatingly hot conditions. But if you're not fit, if you're overweight, or if you suffer from heart disease, diabetes or respiratory problems, you're also at high risk because these conditions can hamper the body's ability to regulate its core temperatures in extreme heat.

Fatal heatstroke occurs 3.5 times more frequently in overweight or obese adults than those of average body weight, according to research

published last year in the Canadian Medical Association Journal.

Those living with diabetes also have significantly higher rates of heat illness and death during heat waves than the general population, in part because they may have nerve fibers that don't signal the blood vessels to dilate. This could decrease the amount of blood brought to the skin's surface to dissipate heat, according to the review. Some evidence also shows people with diabetes may have a reduced ability to sweat.

In a heat wave, stress on the heart can be exacerbated by dehydration as the body's core temperature rises. "To get the blood flow out to the skin, our cardiovascular system has to work hard," said Lacy Holowatz, a professor of kinesiology at Penn State University who researches thermoregulation, or the body's ability to regulate its temperature.

"For every one-degree Celsius rise in core temperature, a typical person's heartbeat goes up 30 beats per minute," she said. "So heat is a stress on the cardiovascular system, even without exercise."

The older you are, the harder your cardiovascular system has to work to get the blood to the surface of the skin. Though heat stress can be dangerous for everyone, "most people who have problems with heat have a cardiovascular issue, including heart attack and stroke," said Holowatz.

Children under age 2, meanwhile, don't have fully developed systems to regulate body temperature.

Heat exhaustion, the mildest form of heat-related illness, can develop in those who are exposed to high temperatures over several days and haven't adequately replaced the water and salt they lose when they sweat. Common warning signs include cramps, fatigue, dizziness and nausea.

If it's not treated, heat exhaustion can progress to heat stroke, which

occurs when the body can't regulate its internal temperature - when the sweating mechanism fails and the body is unable to cool down.

When the body's temperature rises past 103 degrees, cell damage can occur and organs begin to shut down. The intestines may become more permeable, for example, allowing harmful bacteria to get into the bloodstream, Gania said.

Enzymes in our cells work at certain temperatures, and if it's too hot, the cells break down. "The enzymes and cell will actually degrade and break down when they reach a critical temperature," Gania said. "Think of butter melting. They can no longer hold themselves together when they get too hot."

In addition to a high body temperature, heat stroke victims may have red skin to due to increased blood flow or dryness. In some people, the body stops sweating when the core temperature increases, though it's not known why. They may be confused or lose consciousness, though the exact reasons for heat's effects on the brain are unknown.

Heat stroke can cause death; the core body temperature of a 65-year-old man who died Tuesday while mowing his lawn near Wichita, Kan., was 107 degrees, Reuters reported.

For most people, experts say it's best to stay inside during periods of excessive heat. Air conditioning - which can be found in public buildings - is the best way to protect yourself against heat-related illness and death, according to the Centers for Disease Control and Prevention.

But if you are going to exert yourself outside - whether it's gardening or running - it's safer to do it before the sun rises and before it gets too hot. Other advice includes staying hydrated and going more slowly and for shorter periods than usual.

Over time, your body can adjust, said Holowatz. Humans are tropical animals with "an amazing ability to thermoregulate during heat," she said.

"We defend our temperature within a more narrow range compared to other species to protect our tissues," she said. "Our bodies are very well adapted to deal with heat provided we can sweat, so our physiology is very cool, so to speak."