Q&A: As a summer heat wave pummels the US, an expert warns about the dangers of humidity

July 17 2023, by W. Larry Kenney

Credit: Pixabay/CC0 Public Domain

Because of climate change, summers are getting hotter and more humid—much more humid. SciLine interviewed Dr. W. Larry Kenney, professor of physiology and kinesiology at Penn State University, who discussed why humid heat can be dangerous to human health and, in

some cases, life-threatening; how heat stresses the body, particularly the cardiovascular system; and why infants, athletes and older adults are especially susceptible.

Below are some highlights from the discussion. Answers have been edited for brevity and clarity.

How is climate change affecting the frequency and severity of heat waves in the U.S.?

Kenney: When climatologists talk about the changing climate and global warming, the focus is on the average temperature on Earth—the average surface temperature, the average ocean temperature and so on. Humans are tropical animals; we evolved in tropical climates. And so a change of a couple of degrees Fahrenheit in the average Earth's temperature doesn't have much of an effect on human health directly.

However, if you think of the range of climates as a bell-shaped curve, and then think of that whole curve shifting toward hotter temperatures, it's the extremes that are dangerous. So we'll have more hot days and more extremely hot days, which result in an increased frequency, duration and intensity of environmental heat waves.

Why is humid heat particularly dangerous?

Kenney: The primary means by which humans get rid of body heat that's built up is by evaporation of sweat. The more humid it is, the less of the sweat that we produce evaporates, and the less of that powerful cooling mechanism we have at our disposal.

Other than sweating, how does the body respond to heat stress?

Kenney: The other way we cope with increased body temperature is unique to humans. We pump a lot of blood to the skin to dissipate heat to the environment. So under extremely hot resting conditions, we may pump as much blood to the skin as we pump to the entire rest of the body.

And as we pump more and more blood to the skin, the heart has to work harder and heart rate increases. And in some cases, in some vulnerable populations, that can put a great strain on an already-compromised heart.

Why are infants and older adults particularly vulnerable to heat and humidity?

Kenney: Infants are particularly vulnerable to high heat and humidity, primarily because they're at the mercy of adults to make good decisions to make sure that they're protected from hot conditions, adequately hydrated, properly fed and so on.

Coupled with that, infants don't have a very well-developed thermoregulatory system. Their ability to dissipate heat, once body temperature is elevated … is lower than that of adults.

And so, unfortunately every summer, there are a number of deaths of children left in hot cars by accident, which is a real tragedy.

On the other part of the age spectrum, the elderly are also particularly vulnerable to high heat and humidity for a number of reasons, including socioeconomic factors—lack of access to air conditioning, becoming more sedentary and less fit, and going outdoors less often.

And then physiological changes occur with aging, including a lesser ability to pump blood to the skin, accompanied by more strain on the heart and a lower ability to produce sweat and evaporate that sweat for

cooling.

So individuals on both ends of the age spectrum tend to be particularly vulnerable to what we term classic heatstroke.

Are there any government regulations in place to protect workers from heat?

Kenney: The National Institute for Occupational Safety and Health provides guidance on work/rest cycles, depending on how hard people are working and how hot and humid the environment is.

There is also good information available on heat acclamation procedures for those workers, getting them ready to better tolerate conditions of high heat and humidity. Unfortunately, this is not an enforceable standard.

What should coaches and athletes know about staying safe when exercising in hot conditions?

Kenney: Most of the athletes who succumb to heat-related disorders do so during the first few days of training for their sport—in particular football players during late July and early August, when the players have not really become truly acclimated to exercise in those hot environments.

Coaches need to be knowledgeable about gradually acclimating their athletes to the heat. They also need to be knowledgeable about proper hydration practices. And another thing that coaches need to realize is that many heat-related deaths in athletes across many sports are associated with coaches having the players run wind sprints or do intense exercise at the end of, or very late in, the practice.

The athletes already have a high heat buildup. That's then exacerbated by pushing themselves really hard at the end of practice and core temperature soars. In terms of the athletes, they first and foremost need to listen to their bodies and not push themselves beyond their physiological limits.

There's no way that really trying to tough it out when you have signs and symptoms of heat-related strain or illness makes sense, because your attitude can't overcome physiology.

Is the heat index a good measurement of how hot it feels and how people's bodies are affected by heat?

Kenney: The heat index was developed in 1979 and popularized by the National Weather Service as a measure of how hot it feels when temperature is combined with relative humidity. And there's a long, complex equation that's used for calculating the heat index.

The problem with using the heat index for human health and safety is that it's a perceptual index—it's truly an estimate of how hot we feel in that environment, not the effects of that heat and humidity on the human body.

A better measurement that many people have used is something called wet-bulb temperature. That involves taking a typical mercury thermometer, putting a wick over the bulb and then saturating that wick with water. And as water evaporates from that wick, it cools down the temperature measured by the thermometer. In many ways, it mimics a human sweating and evaporating that sweat.

So wet-bulb temperature is becoming known as a better index of heat strain. It's not perfect. It doesn't account for radiation from the sun, for

example' but it's much better than the heat index because it's much more physiological.

Provided by The Conversation

Citation: Q&A: As a summer heat wave pummels the US, an expert warns about the dangers of humidity (2023, July 17) retrieved 2 May 2024 from https://medicalxpress.com/news/2023-07-qa-summer-pummels-expert-dangers.html