

SOUTHWESTERN NEWS

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Heat-related illnesses in heart failure patients due to impaired cooling response, UT Southwestern researchers find

DALLAS – Oct. 11, 2005 – Reduced blood flow to the skin's surface may be a key cause of heat-related illnesses in patients with congestive heart failure, UT Southwestern Medical Center researchers have found.

The first study to investigate how heat affects people with heart failure shows that one of two ways the body can cool itself is not as effective in those with congestive heart failure relative to healthy individuals. The results, published in today's issue of the journal *Circulation*, emphasize the need for people with heart failure to take special care when the weather is hot, said Dr. Benjamin Levine, professor of internal medicine at UT Southwestern Medical Center and one of the study's two senior authors.

"We wondered whether either sweating or skin/blood responses would be impaired in heart failure patients," said Dr. Craig Crandall, associate professor of internal medicine at UT Southwestern and the other senior author of the study. "We found that for the same level of internal temperature, the heart failure patient does not dilate blood vessels of the skin as much."

He and his colleagues discovered no difference in sweating responses among study participants with heart failure or healthy subjects. However, the skin/blood flow response in those with heart failure was significantly impaired, by as much as 50 percent when compared to the control group.

"The purpose of this study was to find out why patients with heart disease and heart failure are at great risk for having complications when the weather gets hot," said Dr. Levine, director of the Institute for Exercise and Environmental Medicine, a collaboration between UT Southwestern and Presbyterian Hospital of Dallas. "We saw this in particular in the heat wave that hit Chicago in 1995. Of the reported deaths, a large number had a prior heart condition. We wondered why."

The study included 28 participants between the ages of 47 and 55 – half with congestive heart failure and half with healthy hearts. For testing, all were put into tube-lines suits and the temperature of the water perfusing the suits was elevated, resulting in increases in skin and internal temperatures.

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Researchers then studied skin-blood flow and sweating, the two main mechanisms for the body to maintain temperature control.

Increased blood flow to skin works as a kind of radiator for the body. When your heart pumps more blood to the skin's surface, it is drawing out the heat. A healthy person may have to pump three times as much blood as normal if the outside temperature is hot.

Study participants' heat-stress responses were obtained during resting conditions only, not body heat generated through exercise. Blood pressure, heart rate, forearm skin blood flow and sweat rate were collected while 93.2-degree Fahrenheit water perfused through the suit. After six minutes, whole-body heating began by elevating the skin temperature to 100.4 F, a temperature high enough to cause sweating and elevated blood flow to the skin.

"If a person doesn't have enough pump function to get the blood flowing, they're going to have difficulty controlling their body temperature," Dr. Levine said. "Heart failure itself is the inability to pump enough blood to meet the demands of the body – it usually happens in patients who have had a heart attack or other diseases that have compromised the heart muscle."

Dr. Crandall added that physicians have long known anecdotally that people with heart failure are more susceptible to heat-related illnesses. The mechanism for this, however, was not known.

"Since so many variables could impact the level of heat stress such as wind and humidity, we don't have a set an environmental temperature threshold to give to patients with heart failure," Dr. Crandall said. "What we can say is that they should be more aware of the heat and, if they begin to feel overheated, they should get into an air-conditioned environment."

Other UT Southwestern researchers participating in the study were Drs. Armin Arbab-Zadeh and Anand Prasad, postdoctoral trainee clinicians.

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