

## How Heat Affects the Human Body

Human bodies dissipate heat by varying the rate and depth of blood circulation, by losing water through the skin and sweat glands, and as a last resort—by panting, when blood is heated above 98.6 degrees. The heart begins to pump more blood, blood vessels dilate to accommodate the increased flow, and the bundles of tiny capillaries threading through the upper layers of skin are put into operation. The body's blood is circulated closer to the skin's surface, and excess heat drains off into the cooler atmosphere. At the same time, water diffuses through the skin as perspiration. The skin handles about 90 percent of the body's heat dissipating function.

Sweating, by itself, does nothing to cool the body, unless the water is removed by evaporation, and high relative humidity slows evaporation. The evaporation process itself works this way: the heat energy required to evaporate the sweat is extracted from the body, thereby cooling it. Under conditions of high temperature (above 90 degrees) and high relative humidity, the body is doing everything it can to maintain 98.6 degrees inside. The heart is pumping a lot of blood through dilated circulatory vessels; the sweat glands are pouring liquid, including essential dissolved chemicals, like sodium and chloride onto the surface of the skin.



## Heat Wave Safety Tips



**Slow down.** Strenuous activities should be reduced, eliminated, or rescheduled to the coolest time of the day. Individuals at risk should stay in the coolest available place, not necessarily indoors.



**Dress for summer.** Lightweight light-colored clothing reflects heat and sunlight, and helps your body maintain normal temperatures. Cover all exposed skin with a high SPF sun screen, and wear a wide brimmed hat to protect your face and head.



**Drink plenty of water or other non-alcoholic fluids.** Drink plenty of fluids even if you don't feel thirsty. Avoid coffee and tea because they contain caffeine, which increases water loss through urination. Alcoholic drinks also dehydrate by increasing urination. Soda and fruit juices contain more sugar than needed, so they aren't absorbed as easily or quickly as water or commercial sports drinks. Eat frequent small, lower protein meals (fruits, vegetables & salads).



### Spend more time in air conditioned places.

Air conditioning in homes and other buildings markedly reduces danger from the heat. If you cannot afford an air conditioner, spending some time each day (during hot weather) in an air conditioned environment affords some protection. Keep your electric fans running.

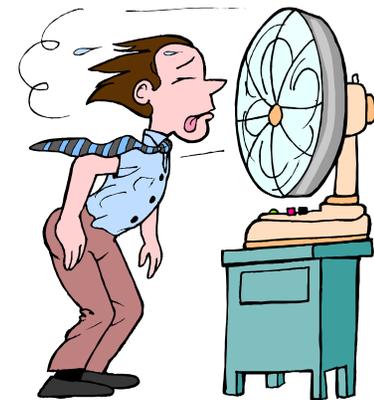


**Don't get too much sun.** Sunburn makes the job of heat dissipation that much more difficult.

**Check on the elderly, infants, young children and people with chronic health problems or disabilities.** They are more vulnerable to the effects of heat.

**Keep pets indoors,** or provide them with shade and plenty of cool water. Refill their water bowls frequently. Do not leave pets, or anyone else, in a closed, parked vehicle.

# Summer Heat: The Silent Killer



Produced as a cooperative effort of the National Weather Service, the Federal Emergency Management Agency and the American Red Cross





One of the biggest weather hazards that affects our region during the summer is heat. Many people do not realize how deadly heat can be. In contrast to the visible, destructive, and violent nature of floods and tornadoes, heat is a "silent killer". The Center for Disease Control (CDC) reports that an average of 350 people die each year due to the effects of heat.

A heat wave is a period of excessive heat lasting 2 days or more that can lead to illnesses in people with prolonged exposure to these conditions. High humidity, which often accompanies heat in our region, can make the effects of heat even more harmful. While heat related illnesses and death can occur with exposure to heat in just one afternoon, heat stress on the body does have a cumulative effect.



The National Weather Service, as part of its mission for protecting life and property, has a measure of how the hot weather "feels" to the body. This table uses relative humidity and temperature to produce the "apparent temperature" or the temperature the body "feels" or what we call the **Heat Index** value. These values are for shady locations only. Exposure to full sunshine can increase heat index values by up to **15°F**. Also, strong winds, particularly with very hot, dry air, can be extremely hazardous as the wind adds heat to the body. The Heat Index Chart is below.

Air Temperature °F	Relative Humidity (%)												
	40	45	50	55	60	65	70	75	80	85	90	95	100
110	136												
108	130	137											
106	124	130	137										
104	119	124	131	137									
102	114	119	124	130	137								
100	109	114	118	124	129	136							
98	105	109	113	117	123	128	134						
96	101	104	108	112	116	121	126	132					
94	97	100	103	106	110	114	119	124	129	135			
92	94	96	99	101	105	108	112	116	121	126	131		
90	91	93	95	97	100	103	106	109	113	117	122	127	132
88	88	89	91	93	95	98	100	103	106	110	113	117	121
86	85	87	88	89	91	93	95	97	100	102	105	108	112
84	83	84	85	86	88	89	90	92	94	96	98	100	103
82	81	82	83	84	84	85	86	88	89	90	91	93	95
80	80	80	81	81	82	82	83	84	84	85	86	86	87

Heat Index (Apparent Temperature)	
Extreme Danger	Heat stroke or sunstroke highly likely
Danger	Sunstroke, muscle cramps, and/or heat exhaustion likely
Extreme Caution	Sunstroke, muscle cramps, and/or heat exhaustion possible
Caution	Fatigue possible



Heat disorders have to do with a decrease in the body's ability to shed heat by circulatory changes and sweating, or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds the level the body can remove, or when the body cannot compensate for the fluids and salt lost through sweating, the temperature of the body's inner core begins to rise and heat related illness may develop. Ranging in severity, heat disorders share one common feature, the person has overexposed or overexercised for his or her age and physical condition in the existing thermal environment.

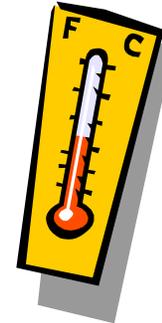
### Heat index/Heat disorders

Possible heat disorders for people in higher risk groups:

Heat index of 130° or higher: heatstroke/sunstroke highly likely with continued exposure.

Heat index of 105°- 130°: sunstroke, heat cramps or heat exhaustion likely, and heatstroke possible with prolonged exposure and/or physical activity.

Heat index of 90°- 105°: sunstroke, heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity.



### How the National Weather Service alerts you to extreme heat conditions:

The National Weather Service in Paducah will highlight heat indices at or above 100 degrees in its forecasts.

Whenever the heat index is forecast to be at least 105 degrees, a Heat Advisory will be issued.

Whenever the heat index is forecast to be at least 110 degrees for at least 2 days, an Excessive Heat Warning will be issued.

## HEAT DISORDERS

**SUNBURN:** The symptoms of sunburn include redness and pain. In severe cases, swelling of skin, blisters, fever and headaches can result. To treat sunburn, ointments usually work for mild cases and if blisters appear but do not break. If blisters do break, apply dry sterile dressing. More serious extensive cases should be seen by a doctor.

**HEAT CRAMPS:** Muscular pains and spasms due to heavy exertion. They usually involve the abdominal muscles or the legs, and can be very painful. If you are caring for a person who has heat cramps, have them stop activity and rest. Have them drink sips of water or a diluted sports drink, at the rate of one-half cup every 15 minutes. Gently stretch the cramped muscle and hold the stretch for about 20 seconds, then gently massage the muscle. Repeat if needed. If there is heavy sweating, cramps will reoccur. If the victim has no other signals of heat-related illness, they may resume activity after the cramps stop, but should avoid any strenuous exercise for at least 24 hours.

**HEAT EXHAUSTION:** Due to prolonged and profuse sweating, the body loses large quantities of salt and water. When salt and water are not replaced, blood circulation diminishes and affects the heart, brain and lungs. With heat exhaustion, sweat does not evaporate, due to high humidity or layers of clothing, so the body is not cooled properly. Symptoms include cool, moist, pale, flushed or red skin, heavy sweating, headache, nausea or vomiting, dizziness and exhaustion. Body temperature will be near normal. Get the person to a cool place in a comfortable position. Give a half glass of cool water every 15 minutes. Remove or loosen clothing and apply cool, wet cloths. Call 9-1-1 if the person refuses water, vomits or loses consciousness. If not treated, the victim's condition will worsen, the body temperature will keep rising, possibly leading to heat stroke.

**HEAT STROKE:** The victim's temperature control system, which produces sweating to cool the body, stops working. The body temperature can rise so high that brain damage and death may result if the body is not cooled quickly. Signals include hot, red and dry skin, changes in consciousness, rapid, weak pulse, rapid, shallow breathing, very high body temperature, dilated pupils, decreased blood pressure, increasing dizziness and weakness, headache, nausea or vomiting, loss of appetite, and mental confusion. Call 9-1-1. Move the person to a cool place and cool the body. Wrap wet sheets around the body and fan it. Wrap ice packs in a cloth and place them on each of the victim's wrists and ankles, in the armpits and on the neck to cool the large blood vessels. If patient starts to shiver, slow down your cooling process, as shivering produces heat. Watch for signals of breathing problems and make sure the airway is clear. Keep the person lying down. Be prepared for convulsions, which occur with body temperatures at around 104 degrees Fahrenheit and produce great body heat.