

**Normothermic** Means normal body temperature. Normal body core temperature ranges from 99.7°F to 99.5°F. A fever is a body temperature of 99.5 to 100.9°F and above. Humans are warm-blooded mammals who maintain a constant body temperature (euthermia). Temperature regulation is controlled by the hypothalamus in the base of the brain. The hypothalamus functions as a thermostat for the body. Temperature receptors (thermoreceptors) are located in the skin, certain mucous membranes, and in the deeper tissues of the body. When an increase in body temperature is detected, the hypothalamus shuts off body mechanisms that generate heat (for example, shivering). When a decrease in body temperature is detected, the hypothalamus shuts off body mechanisms designed to cool the body (for example, sweating). The body continuously adjusts the metabolic rate in order to maintain a constant CORE

**Hypothermia** Core body temperatures of 95°F and lower is considered hypothermic can cause the heart and nervous system to begin to malfunction and can, in many instances, lead to severe heart, respiratory and other problems that can result in organ damage and death. Hannibal lost nearly half of his troops while crossing the Pyrenees Alps in 218 B.C. from hypothermia; and only 4,000 of Napoleon Bonaparte's 100,000 men survived the march back from Russia in the winter of 1812 - most dying of starvation and hypothermia. During the sinking of the Titanic most people who entered the 28°F water died within 15–30 minutes.

#### Symptoms:

Mild hypothermia: As the body temperature drops below 97°F there is shivering, hypertension (high blood pressure), tachycardia (rapid beating heart), tachypnea (rapid breathing), and vasoconstriction (contraction of blood vessels). These are all physiological responses to preserve heat.

Moderate hypothermia: As body temperature drops below 95°F shivering becoming more violent. Muscle mis-coordination becomes apparent. Movements are slow and labored, accompanied by a stumbling pace and mild confusion, although the person may appear alert. Surface blood vessels contract further as the body focuses its remaining resources on keeping the vital organs warm. The subject becomes pale. Lips, ears, fingers and toes may become blue.

Severe hypothermia: As the temperature decreases, further physiological systems falter and heart rate, respiratory rate, and blood pressure all decrease. This results in an expected heart rate in the 30s at a temperature of 82°F. Difficulty in speaking, sluggish thinking, and amnesia start to appear; inability to use hands and stumbling is also usually present. Below 86°F, the exposed skin becomes blue and puffy, muscle coordination becomes very poor, walking becomes almost impossible, and the person exhibits incoherent/irrational behavior including terminal burrowing or even a stupor. Pulse and respiration rates decrease significantly, but fast heart rates (ventricular tachycardia, atrial fibrillation) can occur. Major organs fail. Clinical death occurs.

#### First Aid :

Call 911 or emergency medical assistance. While waiting for help to arrive, monitor the person's breathing. If breathing stops or seems dangerously slow or shallow, begin CPR immediately.

Move the person out of the cold. If going indoors isn't possible, protect the person from the wind, cover the head, and insulate the individual from the cold ground.

Remove wet clothing. Replace wet things with a warm, dry covering.

Don't apply direct heat. Don't use hot water, a heating pad or a heating lamp to warm the person. Instead, apply warm compresses to the center of the body (head, neck, chest & groin). Don't attempt to warm the arms and legs. Heat applied to the arms and legs forces cold blood back toward the heart, lungs and brain, causing the core body temperature to drop. This can be fatal. Most patients who die during active rewarming die from cardiac arrest.

Don't give the person alcohol. Offer warm nonalcoholic drinks, unless the person is vomiting.

Don't massage or rub the person. Handle people with hypothermia gently because their skin may be frostbitten, and rubbing frostbitten tissue can cause severe damage.

Rewarming of the severe hypothermia patient is best carried out in a Hospital's Emergency Room using a pre-defined protocol.

**Hyperthermia** Hyperthermia is elevated body temperature when a body produces or absorbs more heat than it dissipates.

Hyperthermia is defined as a temperature greater than 99.5°F to 100.9°F depending on the person. The normal human body temperature in health can be as high as 99.9°F in the late afternoon. Hyperthermia requires an elevation from the temperature that would otherwise be expected. Body temperatures of 104.0 to 106.7°F are classified as Hyperpyrexia and is life

#### Symptoms

Heat stress: Strain is placed on the body as a result of hot weather.

Heat fatigue: A feeling of weakness brought on by high outdoor temperature. Symptoms include cool, moist skin and a weakened pulse.

Heat syncope: A sudden dizziness experienced after exercising in the heat. Skin appears pale and sweaty but is generally moist and cool. Pulse is weakened and the heart rate is usually rapid. Body temperature is normal.

Heat cramps: Painful muscle spasms in the abdomen, arms or legs following strenuous activity caused by a lack of salt in the body.

Heat exhaustion: Person may be thirsty, giddy, weak, uncoordinated, nauseated and sweating profusely. Body temperature is normal and the pulse is normal or raised. The skin is cold and clammy.

Heat stroke: A body temperature above 104°F. Confusion, combativeness, bizarre behavior, faintness, staggering, strong and

#### First Aid

The underlying cause must be removed. Mild hyperthermia caused by exertion on a hot day may be adequately treated through self-care measures, such as increased water consumption and resting in a cool place. Fever-reducing drugs such as paracetamol and aspirin have value in treating hyperthermia.

When body temperature is significantly elevated, mechanical cooling methods are used to remove heat and to restore the body's ability to regulate its own temperatures. Passive cooling techniques, such as resting in a cool, shady area and removing clothing can be applied immediately. Active cooling methods, such as sponging the head, neck, and trunk with cool water, remove heat from the body and thereby speed the body's return to normal temperatures. When the body temperature reaches about 104°F, or if the affected person is unconscious or showing signs of confusion, hyperthermia is considered a medical emergency that requires treatment in a proper medical facility. In a hospital, more aggressive cooling measures are available, including intravenous hydration, gastric lavage with iced saline, and even