

Hypothermia

Hypothermia is when the body gets very cold and cannot warm up on its own. This can occur after being in cold air or water for too long. This occurs not only during winter months, but also during other times of the year such as if someone falls into very cold water when boating. Even milder weather can cause hypothermia depending on the person's age, body mass, body fat, overall health, and length of time exposed to cold temperatures.

Infants and babies sleeping in cold bedrooms are at risk just as are frail, elderly adults who may be exposed to colder temperatures at home during a power outage. Hypothermia can cause serious problems or death if not treated within a short time. States with the highest death rate from hypothermia include Alaska, New Mexico, North Dakota and Montana.

The normal body temperature is 98.6 degrees Fahrenheit. Hypothermia occurs when it drops below 95 degrees Fahrenheit. With severe hypothermia, the core body temperature can drop below 86 degrees.

How does cold exposure cause hypothermia?

When the body is exposed to cold temperatures, most of the body's heat is lost through the skin. Exhaling from the lungs also causes heat loss. Wind or moisture speeds up the loss of heat through the skin.

The body attempts to compensate for the heat loss by triggering processes to heat itself. This is called thermoregulation. Shivering is one such mechanism as the act of shivering produces heat through muscle activity. Blood vessels also narrow temporarily so less blood reaches the skin and thus isn't cooled as fast. Some drugs can affect the body's ability to narrow the blood vessels. As the core body temperature cools, some organs, the heart and lungs, tend to "shut down" to preserve heat and protect the brain. Further lowering of the body temperature slows brain activity, breathing, and heart rates.

Who is at risk?

Babies, young children, and the elderly are more likely to get hypothermia. This is because their bodies have a harder time keeping warm. They also may not notice that they are getting cold.

Persons with intellectual disabilities or physical disabilities such as cerebral palsy are also at higher risk for hypothermia. Some may not know

how to keep warm when exposed to the cold. Persons who cannot move their bodies easily cannot generate heat from muscle movement. They may also not be able to cover exposed parts of their skin.

People who have problems with alcohol also have a higher risk for getting hypothermia. Alcohol can make it harder to notice when the body is getting too cold. Also drinking too much alcohol can cause someone to pass out, which can lead to hypothermia in cold weather.

Health issues and certain medications can affect the body's ability to regulate itself when cold. Hypothyroidism, multiple sclerosis, strokes, Parkinson's disease, pancreatitis and sepsis are some of the conditions which affect thermoregulation. Medications which affect thermoregulation include:

- sedatives or sleeping pills
- tranquilizers (benzodiazepines) such as lorazepam
- antidepressants, antipsychotics
- some heart drugs including beta blockers and clonidine

Symptoms:

Hypothermia can happen slowly and cause confusion, thus a person may not realize that he/she has become too cold. In severe hypothermia, a person may become unconscious without signs of breathing or a pulse. Signs and symptoms of hypothermia in an adult include:

- shivering
- slow, shallow breathing
- a slow, weak pulse
- clumsiness, loss of coordination
- numb hands and fingers
- trouble speaking with slurred or mumbled speech
- confusion
- memory loss
- fatigue
- cold, red skin

Stages of hypothermia:

Temperature	Stage	Symptoms
97 to 99°F (36.1 to 37.2°C)	Normal body temperature	
90 to 95°F (32 to 35°C)	Mild hypothermia	Shivering, goose bumps, bluish skin, confusion, trouble speaking, memory problems
82 to 90°F (28 to 32°C)	Moderate hypothermia	Shivering stops, sleepiness, seeing things that aren't there (hallucinations)
Less than 82°F (28°C)	Severe hypothermia	Stiffness, Loss of consciousness or coma, breathing stops, heart stops

Treatment:

Hypothermia is a possible life-threatening condition that needs immediate attention. If someone is in danger of hypothermia, you should:

- move the person to a warm, dry shelter as soon as possible
- remove any wet clothing
- protect the person against wind, drafts, and further heat loss with warm, dry clothes and blankets
- begin rewarming with extra clothing and warm blankets
 - hot packs or heating pads should be avoided as these can cause burns to the skin
- take the person's temperature if possible
- offer warm beverages if the person is able to drink
 - avoid alcohol and caffeine, which speed up heat loss
- do not briskly rub or massage the person's extremities as with severe hypothermia; this muscle activity can cause the heart to stop
 - strenuous muscle activity should also be avoided

If the person is unconscious, or has no pulse or signs of breathing, call for emergency help right away and begin CPR. Even though someone with severe hypothermia can appear dead, continue CPR until the person can be

transported to a hospital. In some cases, hospital treatment is required to rewarm the core temperature before normal body functions resume.

Complications of severe hypothermia include pneumonia, heart rhythm problems, cardiac arrest, and death. There is a 40% risk of dying from severe hypothermia.

Prevention:

Cold injuries can be prevented if you are prepared when out in cold weather.

- Avoid staying out in the cold for long periods of time
- Dress warmly and in layers
- Head for a shelter that will protect from wind or rain if you are wet or cold
- Avoid activities that cause increased sweating. Sweating increases heat loss through evaporation and will cause you to feel cold.
- Avoid touching metal, especially with wet hands, because it will make you feel colder and may cause frostbite.
- Avoid drinking alcoholic beverages because alcohol:
 - interferes with the body's ability to regulate body temperature
 - affects judgment
 - can cause blood vessels in the skin to dilate and thus increase heat loss
 - reduces the body's ability to sense cold because it depresses the nervous system
- Avoid drinking caffeine or smoking while out in the cold
 - Nicotine (from tobacco) and caffeine cause narrowing of the blood vessels in the hands and feet. When vessels are narrowed, less blood can get to those areas causing the hands and feet to become cold.

Frostbite

(and other cold related tissue injuries)

Frostbite occurs when tissues freeze. This happens because in the cold, the blood vessels narrow which reduces blood flow and oxygen to the tissues. Frostbite usually affects body parts that are farther away from the body core, and therefore, normally, have less blood flow. These include your feet, toes, hands, fingers, nose, and ears. It can affect any part of the body.

When there is less blood flow and heat delivered to tissue, this results in ice crystals forming in cells which cause cell death. Damage to the tissue is worst when there is prolonged cold weather exposure, the tissue freezes slowly, and the rewarming process is slow.

Frostbite injury is classified as either superficial or deep, depending upon the depth of injury. Deep frostbite extends beyond the superficial skin and involves tendons, muscles, nerves, and even bone.

Signs and symptoms of frostbite

- the areas affected feel cold and firm
- sensations of burning, tingling, stinging, or numbness,
- clumsiness can occur due to loss of motor control
- when the affected body part is rewarmed, a throbbing or burning pain may be felt

Treatment:

Frostbite requires immediate treatment, ideally in a medical facility. Before transporting to a medical facility the affected area should be gently and loosely wrapped in a dry sterile bandage or clean blanket to prevent further trauma.

The most effective treatment is rapid rewarming which may be accomplished by immersion of the affected area in a circulating tub of warm water that is between 104 to 108 degrees Fahrenheit for 20 to 40 minutes or until thawing is complete. Warm wet packs can be used if a tub is not available. It is important not to rapidly rewarm and thaw the area if there is a risk that it may refreeze as this can lead to worse tissue damage. During the rewarming process, pain may be extreme, requiring pain medication.

Other Cold Related Tissue Injuries

There are some conditions that occur without freezing the skin. These include chilblains, trench foot, and frostnip.

Chilblains:

Chilblains occur due to an abnormal vascular response several hours after the area that was exposed to the cold is re-warmed. They are characterized by:

- itchy, painful, reddish or purplish areas of swelling usually affecting fingers, toes, nose or ears.
- blisters or small open sores may develop
- symptoms that last for several days
- after healing, the area may be very sensitive to the cold in the future

Persons are more at risk for getting chilblains if they use nicotine or other drugs that reduce blood flow to the extremities.

Trench foot:

Trench foot is named after the condition suffered by soldiers in the trenches during World War I. It develops after a prolonged exposure to a wet, cold environment and is more serious than chilblains. Tight fitting boots or shoes can exacerbate the condition. Trench foot does not require freezing conditions but can occur at temperatures up to 60 degrees Fahrenheit.

Symptoms include:

- pain
- itching
- numbness
- swelling
- red, blotchy skin or blue-black with advanced injury
- blister and open sores can develop

With severe trench foot, the tissue dies and falls off. Gangrene can develop and the foot may need to be amputated.

Frostnip:

Frostnip occurs in mild cold weather and usually affects the face, ears, toes, and fingers. Symptoms appear after exposure to cold weather and include:

- pale appearance of the skin
- burning, itching or pain
- tingling and numbness

Simple rewarming restores the normal color and sensation with no permanent tissue damage.