

## Frostbite

Frostbite occurs when the tissues of the skin freeze. This can happen during prolonged exposure to cold weather, or even after a few minutes in extremely low temperatures. Cold winds increase the likelihood of frostbite because the movement of air removes body heat away from the skin more rapidly.

Factors such as exhaustion, hunger and dehydration further lower the body's defences against frostbite. The extremities, such as the hands and feet, are typically at risk because of their greater susceptibility to heat loss.

Frostbite is often the result of a lack of preparation. The risk can be reduced with greater awareness and preparation for cold weather conditions.

### Formation of ice crystals in skin cells

When the body is exposed to very low temperatures, it tries to prevent heat loss by redirecting the blood away from the extremities such as fingers and toes. If exposure is prolonged, ice will start to form inside and around skin cells. The ice crystals block the movement of blood through the fine mesh of capillaries, which means the tissue is deprived of oxygen and nutrients. The longer the tissue remains frozen, the greater the amount of damage.

### Symptoms

Symptoms of frostbitten skin may include:

- Cold, white and hard skin
- Pain
- Itching
- Loss of feeling in the affected area
- Mottled skin
- Swelling and blistering
- The skin becomes red and blotchy when warmed
- Tissue loss, depending on the severity of the frostbite.

### Severe frostbite

If the fluid inside blisters is clear, then a full recovery is likely. However blood-filled blisters signal damage to the deeper tissues.

Typically, the affected skin becomes hard and black. This is called dry gangrene. Wet gangrene, where the skin looks soft and grey, can also occur. Gangrenous skin will eventually fall away but, in some cases, surgery is required to remove it.

### First aid

First aid for frostbite includes:

- Seek shelter and reduce further exposure to the cold and wind.
- Remove any wet or restrictive clothing and replace with dry clothing wherever possible.
- Wrap the person in blankets and warm the person's entire body.
- Do not rub the affected area.
- Do not expose the person to direct radiant heat such as a fire.

- Take the pressure off the affected area to prevent further damage; for example, don't allow the person to walk on frostbitten feet.
- Don't allow the person to smoke cigarettes, since nicotine constricts the blood vessels.
- Do not attempt to thaw affected part if there is a chance of it being refrozen.
- Do not break blisters.

## Thawing the affected area

Most of the damage of frostbite occurs during or after rewarming or thawing of the affected tissues. Damage can occur when an area is rewarmed and then exposed again to cold.

Thawing is painful and should only be attempted when medical assistance is not immediately available. To thaw an area affected by frostbite:

- Apply warm towels or immerse the area in circulating warm water.
- Do not use hot water.
- Do not rub the area in any way.
- Once thawed, wrap the affected area in clean bandages.
- Avoid exposing the affected area to cold or wind.
- Seek professional help immediately. Dial triple zero (000) in an emergency.

## Thawing and refreezing is dangerous

If frostbite occurs far from help, it may be unwise to thaw out the affected areas in case they refreeze again.

If the feet are frostbitten, but the person has no option other than to keep walking, it is better to walk on frozen feet, since thawed tissue can be greatly harmed by mechanical damage or pressure.

## Treatment options

A person with severe frostbite needs to be treated in hospital. Treatment options in hospital include:

- Warming the extremities in water
- Testing the blood circulation in the affected areas with scans
- Medications, to prevent infection
- Antibiotic lotions
- Tetanus shot
- Keeping the warmed extremities dry and sterile
- Rehydration of the person
- Oral and intravenous drugs, to improve circulation
- Highly nutritious foods
- After a few weeks or months, surgery to remove the blackened dead skin.

## Long-term damage

A person who has experienced severe frostbite will have long term damage, despite the best medical care. The damage may include:

- Numbness
- Sensitivity to the cold
- Problems with nail growth.

## Preventing frostbite

Exposure to cold weather, even for relatively brief periods of time, can be dangerous if you are not adequately prepared. Shivering and feeling cold or numb are warning signs that the body is losing too much heat.

Children are at greater risk as they have a smaller body mass. Extra care must be taken to ensure that their clothes are as dry and as many layered as possible.

A water proof hat is essential as children lose heat through their heads and scalp much quicker than adults. Ears are at great risk from frostbite.

Simple ways to prevent frostbite include:

- Avoid prolonged exposure to cold weather.
- Several layers of clothing hold body heat more efficiently than just one bulky layer.
- A weatherproof outer layer keeps the body dry.
- Use gloves, scarves and socks. Carry spares in case the ones you are wearing get wet.
- Insulated boots.
- Warm headgear, since considerable body heat is lost through the scalp.
- Drink plenty of fluids.
- Eat regularly.
- Keep your eye on the exact temperature by taking a thermometer with you.
- Change out of wet clothes straight away.
- Avoid alcohol, cigarettes and caffeine.
- Check your skin frequently for any signs of frostbite.

## Where to get help

- Your doctor
- Hospital emergency department
- In an emergency, call triple zero (000)

## Things to remember

- Frostbite occurs when skin tissue freezes after exposure to cold weather.
- The extremities, such as the hands and feet, are at greater risk because they are more susceptible to heat loss.
- Symptoms of frostbite include cold, hard and white skin, and numbness.

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Ambulance Victoria

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