# Essentials: Frostbite

**Frostbite is localized freezing of tissue that results in a range of signs, symptoms, and outcomes for alpinists**. The areas farthest from the body core (fingers, toes, ears, nose, and genitals) are most commonly affected. Early recognition and subsequent rewarming are essential to minimizing the extent of tissue damage. The following recommendations are based on the Wilderness Medical Society's "Practice Guidelines for the Prevention and Treatment of Frostbite."

## PREVENTION

Clothing must be sufficient to protect the climber from wind and cold. Clothing layers that get wet, either from overexertion or precipitation, should be changed out for dry layers as soon as practical. When tissue initially becomes cold and numb, alpinists should actively rewarm those areas before continuing their ascent/descent.

## ASSESSMENT

Frostbite is commonly classified into two categories: superficial or deep. Rewarming of the affected tissue must be completed prior to evaluation of injury severity, as hallmark signs and symptoms can be masked when tissue is frozen. Superficial injuries tend to heal within the first month if not allowed to refreeze, while deep injury can result in ongoing pain and potentially permanent tissue loss. Each instance of frostbite will predispose a climber to increased risk for future frostbite injury.

**Superficial Frostbite** (Damage limited to the outermost layers of skin)

- Numbness
- Blanching of skin (pale)
- Skin remains pliable
- Mild pain and swelling upon rewarming
- No immediate blister formation, but clear-fluid blistering is possible

**Deep Frostbite** (Inner and outer skin layers affected, with potential underlying muscle, tendon, and bone damage)

- Significant diminishment of circulation, sensation, and motion
- Skin discoloration (red, purple, and/or black)
- Skin is frozen and non-pliable
- Intense pain and significant swelling upon rewarming is likely
- No immediate blister formation, but blood-filled blisters are likely
- Eschar (black, dead tissue) can develop over days/weeks following rewarming

## FIELD TREATMENT

Patient should be removed from the cold environment and wet layers exchanged for dry. Hypothermia should be treated before any frostbite injury. Once hypothermia is managed, as long as

there is no chance of the tissue refreezing, it should be thawed immediately, either by skin-to-skin rewarming or warm-water bath (99°–102°F, 37°– 39°C), if available. Do not rub injured tissue—friction may cause additional damage. Do not allow frostbitten tissue to refreeze. Loose-fitting gauze, aloe vera, and ibuprofen should be used if available. Pain control may be required, especially with deep frostbite.

**HOSPITAL TREATMENT**

Advanced treatments now available at specialized centers offer improved chances of preserving tissue damaged by deep frostbite. Note that thrombolytic therapies (clot busting) require immediate patient evacuation—the elapsed time from thawing of frozen tissue to arrival at a burn/frostbite center must be no greater than 24 hours. Climbers or their physicians should contact local burn specialists or the University of Utah Burn Center (801-581-2700) for deep frostbite consultation and treatment.

Dave Weber is a Denali mountaineering ranger and lead medic, and flight paramedic for Intermountain Life Flight in Salt Lake City.

## Images

Deep frostbite injury.

## Article Details

| | |
|---|---|
| Author | Dave Weber |
| Publication | ANAM |
| Volume | 10 |
| Issue | 68 |
| Page | 38 |
| Copyright Date | 2015 |
| Article Type | Feature article |