

# Thermal Protection

## Introduction

A very common issue that most paddlers will encounter is mild hypothermia. Hypothermia is a condition where the body loses heat faster than it can produce. The early stages are shivering and loss of circulation. For many, the lips turn a blueish color. The body gradually limits blood flow to your extremities (hands & feet) protecting your core. Holding your paddle or a throw rope may be challenging. Signs like these are often dismissed which can lead to serious consequences. The best prevention is food, water, and proper thermal wear. Paddlers need to dress for full immersion (even if they have a bomb proof roll). Even if you never swim, you may be needed for a hands-on rescue. Entrapments may leave you immersed for a long period of time waiting to be rescued. Although cautious, I prefer the 50:50 rule – if either the water or air temperature is 50° or lower, you need to be prepared for hypothermia.

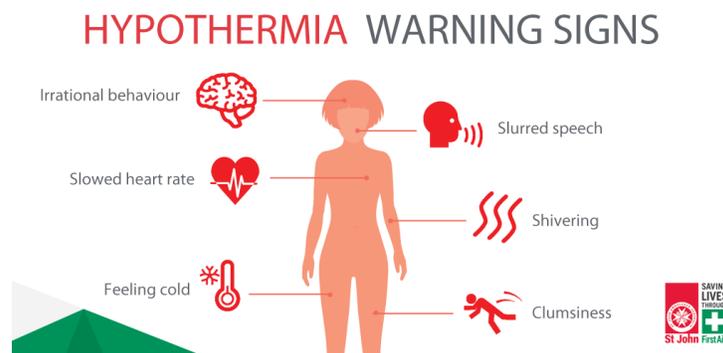


Figure 1: St. John Victoria Blog

## Stages of Hypothermia

The literature varies a bit on the body temperatures for each. Frankly, that's not as important as the actual symptoms which are provided here for reference:

- Mild Hypothermia:
  - 95° - 96.8°
  - Shivering decreases in complex motor functions, periphery constrictions (fingers & toes)
  - NOTE: Many choose to ignore the problem at this stage, don't fall into that trap
- Moderate Hypothermia:
  - 91.4° – 95°
  - ALoR (Altered Level of Responsiveness), loss of fine motor functions (hands), UMBLES, irrational behavior
  - Very serious, seek medical attention. Transport the victim to the nearest hospital facility.
- Severe Hypothermia:
  - 86° – 91.4°
  - Shivering irregular or ceases, fetal position, pale skin, dilated pupils, pulse rate declines
  - High potential for cardiac arrest!
  - Often fatal, must be treated in a hospital

## Thermal Protection

### Treatment

On cold weather trips, I have honey packets in my first aid kit and plenty of dark chocolate. I also pack a full [storm hood](#) in my Pelican Box and carry a [skull cap](#) in my PFD pocket. If someone swims, the honey acts as kindling for the metabolism. The Chocolate adds some sticks to the fire. I offer the hood which warms the swimmer very quickly and then they switch to the skull cap. Be proactive and nip hypothermia before it gets out of hand.

Some other measures I use. I carry Glacier Gloves (see image below) in my pin kit and wear [pogies](#) for paddling. I can loan out the Glacier Gloves if someone is experiencing cold hands. I also carry [hand warmers](#) in my First Aid kit for more extreme conditions.



Figure 2: Hypalon Palm Glacier Gloves

Make certain everyone has plenty of water as that helps the body regulate your core temperature. Some bring a thermos of warm beverage which is certainly helpful.

Treat moderate hypothermia very seriously. If feasible, get them dry ASAP and sheltered from the elements – especially wind. Today’s kayaks have empty space beyond the bulkhead. You can easily store a [Tyvek tarp](#) there which weighs nothing and doesn’t get funky. This can become a fast shelter and huddling (or add a candle) can get very warm quickly. More severe hypothermia victims should be evacuated and sent to a hospital.

Severe hypothermia can be deadly and has a host of complications. Cardiac issues are not uncommon. Be very gentle in handling and don’t rub to warm (excessive jarring may cause cardiac arrest). Strip, dry, and insulate. Add warm (not hot!) water bottles under the armpits, groin and abdomen. Treat for shock and monitor vitals. The victim must be evacuated for proper treatment.

### Heat Loss

It’s important know how the body loses heat to mitigate (or use to cool off).

- Evaporation: Nature’s air conditioner – sweat. Evaporation works with wet clothing and a little breeze. We can mitigate by staying dry (like a dry suit in the Winter).
- Radiation: The body can be thought of as a great big radiator throwing off heat. 65% of heat loss is via radiation and the head is the largest heat sink. Adding insulation, covering the head go a long way in reducing this method of heat loss.
- Conduction: This is heat transfer to another medium, usually water for paddlers. When someone takes a swim, cold water sucks the heat away rather rapidly. Minimizing this heat flow via a dry suit with insulation or a wetsuit (which traps water in the spongy material) works quite well.

## Thermal Protection

- Convection: The famous wind chill factor. Take steps to greatly reduce heat loss via convection by blocking the wind. Non-breathable shells like splash jackets are far more effective than breathable fabrics.

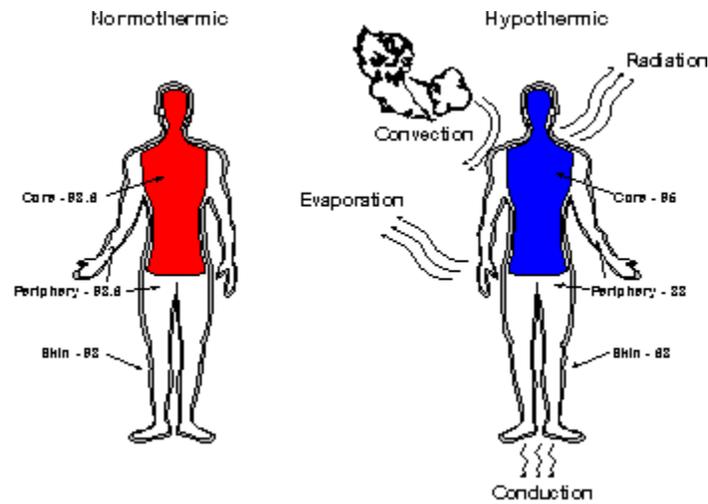


Figure 3: Princeton University Hypothermia

### How to add Heat

There many ways to turn up the heat:

- Food: Start metabolic combustion with some form of sugar. Sugar is quickly absorbed by the body and is the best fire starter (kindling). Once the fire is started, it's time to add small sticks – protein and complex carbohydrates. Energy bars, nuts, etc. work well here. Now that the fire is going, add foods with a high fat content (logs). Chocolate is a good example. Fats do require water to digest so drink plenty of fluids. Avoid alcohol (vasodilator) and caffeine (diuretic).
- Physical Activity: While feeding and adding suitable extra layers, drain their boat and have them get back in if feasible. The boat provides some shelter on the lower half of the body and paddling is a form of exercise that can generate a fair amount of heat.
- Radiant Heat: A campfire is the best example assuming you are done paddling for the day. A space blanket can be used to prevent radiant heat loss (or reflect from a fire).
- Shelter: Get inside a tent which cuts heat loss from wind and inside a sleeping bag (insulation).
- Conduction Heat: Chemical handwarmers are inexpensive and last many hours.
- Clothing: Cut the wind via a splash jacket (non-breathable works best). Add a polypropylene layer next to the skin (even works under a wetsuit).
- Fluids: Sugary warm drinks can be beneficial for warming from the inside. Many paddlers carry a thermos of hot chocolate or sweet cider on Winter trips.

### Prevention

The [Float Plan](#) is a great planning tool. Part of the float plan is a weather forecast and water temperature – all germane to hypothermia prevention. After that, I find the pre-shuttle check quite valuable. Besides checking critical group gear, I pay attention to individuals that may be prone to hypothermia:

## Thermal Protection

- Young children
- Thin people
- Many women (extremities: hands & feet)
- Older individuals with underlying medical issues
- Persons with diabetes

I bring extra thermal gear and fortunately it fits a wide variety of sizes. I also carry a storm hood and a skull cap in my PFD pocket. I find pogies work best for paddling, but you need to bring gloves as well. Mittens like the [NRS Toaster Mitts](#) are far warmer than gloves.

Dress for Rescues (full immersion). For Fall and Spring paddling, a [farmer john wetsuit](#) with a [splash jacket](#) works fine. A neat trick I used to use (before dry suits came out) was pre-wetting in a hot shower. For Winter paddling, I recommend a high-quality [dry suit](#) with a thick [union suit](#) underneath.

I favor small streams and shorter high gradient runs for cold weather paddling. These runs keep you quite busy generating a lot of heat. Smaller streams also provide significant protection from wind gales. Also consider runs with intermediate take-outs just in case of swims or exhaustion. Keep the group moving, short breaks are OK but avoid long lunch breaks.

### Value of a Life Jacket

When your body first encounters cold water as in a swim, there's a natural tendency to gasp. Trying to stay afloat without a [life jacket](#) is incredibly tiring. A snug life jacket also provides some insulation. The most important benefit is maintaining your airway. I highly recommend watching the following video: [Cold Water Boot Camp](#).

### Fluids

Fluids are a crucial component in regulating your body heat:

- Shock Absorber: Water has a high heat capacity, it absorbs a great deal of heat before its temperature rises. You can think of the human body as a great big radiator and your anti-freeze is the water in your cells. The circulatory system distributes the heat where its most beneficial like the extremities when it needs to cool off or the core when heat needs to be conserved.
- Circulation: Muscles are 75% water and generate heat which is distributed throughout the body. The hypothalamus controls sweating.
- Sweat: Sweat cools the body via evaporation. We need to replenish this moisture loss even in the Winter. Controlling sweat loss by not over dressing or too strenuous activity is important in heat loss prevention.

### Conclusions/Recommendations

Hypothermia is an issue we must pay attention to. I doubt anyone that has been paddling for several years hasn't encountered this issue. Prevention is crucial:

- Planning
- Awareness – Know how to spot issues before they get out of hand
- Proper Clothing
- Prompt Rescues (limiting exposure)
- First Aid Training (treatment)

## Thermal Protection

- Plenty of food & fluids

The rewards are quite substantial:

- Fun Trips
- Rivers that are not crowded
- Spectacular scenery
- Chances to explore runs not in range during Summer months
- Ability to paddle year round