

**Survival  
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# Hypothermia

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For those who are not travelers or adventurers the risk of hypothermia is ordinarily very low. Hypothermia mitigation is a vital component of training at Survival Systems USA and an understanding of this complex phenomenon can save lives. The affects of the cold on humans has been well-studied and documented, but there is still some debate in exactly what hypothermia is and how its affects can kill humans. Much of this is due to the fact that hypothermia can be described in stages and each stage has its own variants and criteria. This article will discuss water based hypothermia, although much of it translates to general hypothermia.

## **Hypothermia Fast Facts:**

Humans lose body heat 24 times faster in water than in air.

Hypothermia is the condition in which the core body temperature drops below the required temperature for normal metabolism. This is normally considered to be 95 degrees F-35 degrees C.

There are four distinct classifications of hypothermia: (Body core temp.)  
Mild, 90-95 degrees F, Moderate 82-90 degrees F, Severe, 68-82 degrees F, and  
Profound, less than 68 degrees F.

The definition of “cold water” is any body of water less than 60 degrees F. The average worldwide ocean temperature is 50 degrees F.

The lowest recorded body temperature of a victim who survived is 55.4 degrees F, in a 7 year old female after a drowning incident in Sweden in Dec. 2010

The most incredible tale of hypothermia survival is probably that of Dennis Hale. On November 29th, 1966, the Great Lakes freighter *Daniel J. Morrell* was northbound in Lake Huron, fighting 70 knot winds and 30 foot waves. With no warning, the *Morrell* broke in half. Within minutes, the *Morrell's* crewmen were cast to the mercy of the frigid lake. No distress signal had been sent, and it would be more than a day before the *Morrell* was reported over due. Of her crew of 29, only one man, Dennis Hale, survived. Hale spent 40 hours on a small raft with only boxer shorts and a pea coat for protection. Somehow Hale found the will to survive, enduring the deaths of three shipmates on the raft with him, until spotted by a Coast Guard helicopter. (Hale did not speak of this incident for 24 years, until he wrote his harrowing autobiography, *Shipwrecked: Reflections of a Sole Survivor*.)

### **Hypothermia Symptoms:**

99-96 degrees F: Uncontrollable shivering

95-91 degrees F: Violent shivering, confusion, slurred speech.

90-86 degrees F: Shivering decreases, muscular rigidity, mental confusion.

85-81 degrees F: Pulse and respiration slows.

80-78 degrees F: Unconsciousness, cessation of reflexes, erratic heartbeat.

Less than 78 degrees F: Cardiac arrest, V-FIB, and death.

The first and most critical stage of water related hypothermia is called the *Cold Water Gasp Reflex*, or the *Mammalian Gasp Reflex*. This condition is caused by the sudden immersion of a human into cold water. When immersed in cold water a human will gasp and struggle for air involuntarily. This is especially dangerous in survival situations, as it can lead to airway compromise and the intake of water. In a scenario where there is even a small sea state, this condition is extremely hazardous and is a major cause of drowning in cold water. Data suggest that it is possible to acclimate oneself to this affect, but it takes repeated immersions to control this condition and one's ability to accomplish this is severely affected by time. (As someone who has been in "cold water", and by "cold water" I mean temperatures below 32 degrees F, I can attest that an individual can acclimate themselves to the gasp reflex, but it isn't foolproof and this ability diminishes rapidly without frequent immersions/practice.) Experts have stated that the gasp reflex lasts "only" two to three minutes, but that is a prolonged period to be struggling for breath, especially in the water, and is why most drowning occur in this phase. Keeping control of your breath is vital. If you find yourself in this gasp reflex situation hold your breath and keep from hyperventilating in order to regain control of your breathing pattern.

The second stage of water based hypothermia is swimming failure. This phase can have a rapid onset and though data indicates that death from hypothermia can take 45 minutes, this stage may take only moments to occur after immersion. As the body cools blood is drawn from the extremities to the core, which makes the ability to use one's hands and feet progressively more difficult. If the gasp reflex has occurred and the water temperature is quite cold, even an experienced or physically fit individual can rapidly lose muscle control and drown.

The actual onset of clinical hypothermia is difficult to determine, especially for those without medical training. Each victim is different and each scenario has many variants, and the question begins to arise; what kills a person immersed in cold water? Hypothermia or drowning? The answer is probably both. The cold acts on the body in a way that reduces the ability to use muscles, breath properly, and maintain mental focus, all of which combine to cause a person to drown. Either answer probably doesn't matter to a victim or their loved ones, but it does present the issue of prevention, which will be discussed later.

A possible last stage of hypothermia is something most people would find counter-intuitive. This stage is called after drop or rewarming collapse. 20 percent of people pulled from the water can undergo as much as an 8 degree change in body temperature after being rescued or pulled from the water. That doesn't seem to be logical, but this phenomenon has been recorded since the earliest tales of sea survival. A victim with severe hypothermia who is actively rewarmed can go into shock and die for several reasons. The first is a drop in blood pressure. As the body sends blood back to the extremities from the core, a dangerous drop in BP can initiate cardiac arrest and even cerebral events. This rapid rise can cause shock and cause death by hypovolemia. This is simply an inability to maintain proper body fluid stasis, which can rapidly kill people who have been rescued. Medical authorities and hypothermia experts indicate that anyone with a core body temperature above 90 degrees be actively rewarmed and those below be passively rewarmed. Unfortunately it is difficult, if not impossible to verify the core temperature of a hypothermia victim, so it is best to assume a person is in a critical stage and to passively rewarm them. One way to determine this is, engaging the victim in conversation. If they can converse, more than likely they have mild or moderate hypothermia. If they weave in and out of conversation, have slurred speech or drift off mentally, then assume it is severe hypothermia. Active techniques include rubbing body parts, alcohol rubs, and forceful heating. Passive techniques include the removal of wet clothing, laying a victim on their side, and covering with a blanket or warm fabric. Increased handling or movement of a severely hypothermic victim increases the risk for heart dysrhythmia.

Experts recommend passive rewarming for mild cases of hypothermia, active external rewarming for moderate cases, and active internal (IV, enema) for severe hypothermia. The single best thing you can do for a water-based hypothermia victim is to remove wet clothing. A victim is actually better off standing naked exposed to the air, than to remain in wet clothes. Remember that water removes heat 24 times faster than air.

On a personal note, I have suffered hypothermia on several occasions. Though it is not possible for me to determine my exact body core temperature, I know that I was suffering from at the very least, moderate hypothermia. I can add several observations to classic hypothermia symptoms. I found that nausea was part of my personal symptoms. After vomiting, I also experienced a feeling of euphoria and a false sense that I was warmer, gaining my "second wind", and recovering from hypothermia. Being familiar with the experiences of high-altitude climbers and the effect hypothermia had on them, I was amazed at these accounts of mountaineers removing clothes and being found in t-shirts frozen to death on the slopes of Everest (Undoubtedly, altitude and low oxygen levels play a part in these scenarios.) However, I can attest of a similar experience. After periods of time spent shivering I would then feel "warm" and found myself removing

neoprene gloves and head wear as this feeling intensified. Perhaps the most alarming aspect of this is the fact that I did not in any way feel disoriented. I had no hint that I was suffering a loss of mental acuity or detrimental symptoms. To the contrary, I felt quite alert and quite in possession of my mental faculties, despite the fact that I was removing vital components of my wetsuit in 33 degree water. This phenomenon is called paradoxical undressing and affects 20-50% of hypothermia victims.

\*Note, there is a condition called “Urban Hypothermia” that most often occurs with the homeless and/or those with substance abuse problems. Someone incapacitated from drink, drugs, or a mental condition can suffer the life threatening affects of hypothermia in a relatively brief amount of time. Though this is also rare, keep in mind that an individual, especially someone who has consumed alcohol, can become hypothermic in a relatively short period on a cold wet area, such as concrete or pavement.

Finally we come to prevention, and unfortunately there is little that can be done once you are in trouble. Obviously, wearing proper clothing, keeping hydrated, and preventing immersion in the first place are all ways to avoid hypothermia, but these are not of much use if you have fallen off the boat dock in early March and no one is around to help you get back to safety. There are a few techniques to assist in hypothermia mitigation. At SSUSA, in the hypothermia mitigation section of our courses, we instruct people to maintain the HELP technique. The Heat Escape Lessening Posture/Position is simply getting in as much of a fetal or ball position as possible, to lessen heat loss. This is difficult if not impossible without a life vest or flotation aid, but it does provide a valuable extension of time in which to be rescued. We also recommend our students carry a contractor’s grade trash bag as part of their emergency ditching kit. A trash bag works like a poor man’s wetsuit and can provide valuable minutes to survival time. Plain body heat works as well. If you are immersed with other victims, we instruct people to create the Carpet Formation. This formation allows victims, especially their cores, to remain in the upper surface water, which is normally warmer than lower areas of the water column. Victims can also be placed on top of this formation, especially a victim without a life vest to get them further out of the water and lessen heat loss. However, these techniques will not stave off hypothermia indefinitely. The best prevention for hypothermia is to avoid the conditions that create it.

SSUSA archives, USCG archives and public material, Wikipedia, and *The Essentials of Sea Survival*, by Frank Golden PhD and Michael Tipton PhD were used as sources for this article.