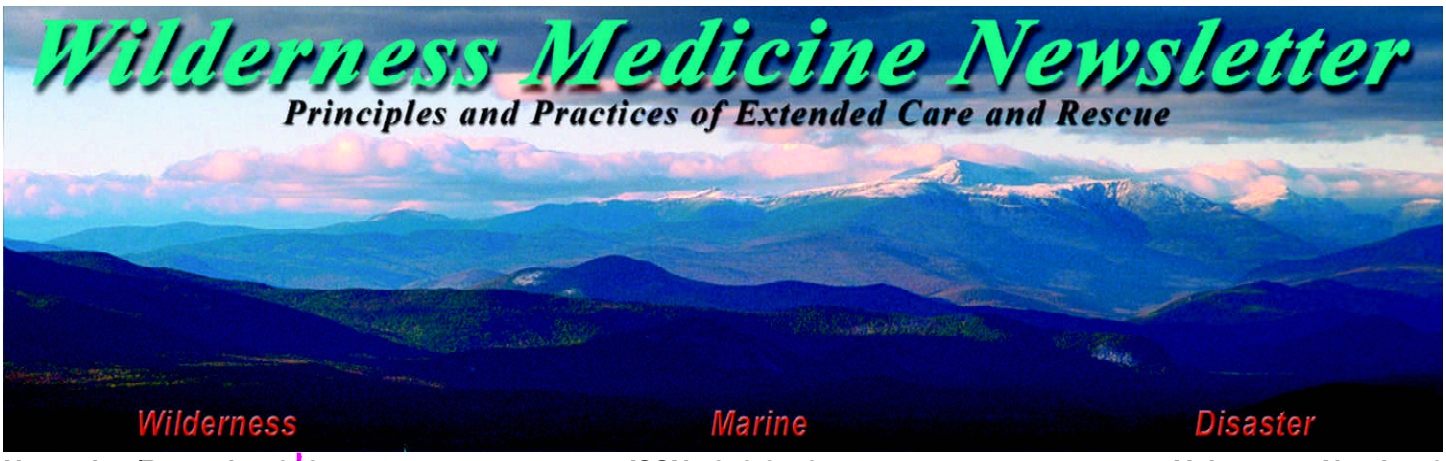
Wilderness Medicine Newsletter
Principles and Practices of Extended Care and Rescue



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FROZEN MYTHBUSTERS

By Gordon Giesbrecht, PhD; Murray Hamlet, DVM; Frank Hubbell, DO

Recently, I (Frank) had the delightful opportunity to spend several days with Gordon and Murray as we taught together at the Northern NH EMS Conference and the Harry McDade Hypothermia Conference. As usual we took great joy in the opportunity to discuss current research, current classroom information, and a variety of rescues involving hypothermia and other cold-related injuries. We recognize that even though there is abundant scientific information, there are still many old wives' tales and misinformation that are being taught, passed on, and utilized in patient care. There appears to be some bad data in education which is causing rescuers to provide inappropriate patient care that can be deleterious to their patients. So, we decided to take a look at the many myths and misinformation that seem to surround cold physiology and cold-related injuries.

Frozen Myths to be Busted

If you fall through the ice, you will die of hypothermia within 5 - 10 minutes.

If your feet are cold, put on your hat.

Warm water or a cup of hot tea will keep you warmer then a glass of soda or orange juice.

Rubbing frostbite is the proper and best way to rewarm frozen parts.

Hypothermia is a disease, the severity of which can be determined by the amount of shivering, and shivering is bad.

You should never actively rewarm a hypothermia victim in the field because you could cause massive peripheral vasodilation, cardiovascular instability, and ventricular fibrillation.

Frostbite is rarely associated with hypothermia.

Hypothermia is an absolute emergency.

If a hypothermia victim is found breathless and pulseless, you should immediately begin CPR and access ACLS as soon as possible.

Hypothermia victims are not dead until warm and dead.

The best way to rewarm a hypothermia victim is to place them naked in a sleeping bag with a warm, naked rescuer so they can share body heat.

There is no such thing as "after drop" while rewarming a hypothermia victim.

Exposing the patient to remove cold wet clothing will cause a large drop in their core temperature.

Myth #1

If you fall through the ice, you will die of hypothermia within 5 – 10 minutes.

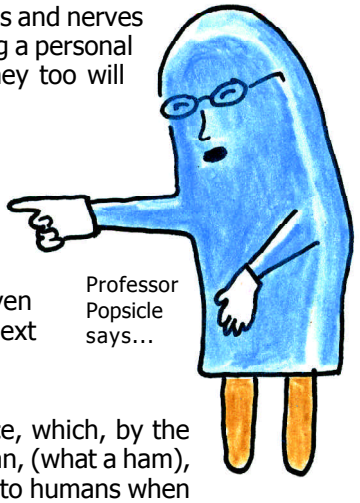
If you live in Alaska or around any large body of open, cold water, then you have probably heard this statement dozens of times. It is usually spoken with a curled eyebrow and a facial expression to reinforce the fact that anyone with half a brain knows this. Well, guess what? It's a bold-face lie. The reality is that you simply cannot die of hypothermia in 32ºF (0ºC) water in 5 – 10 minutes. However, there are several possible scenarios that can lead to a rapid demise if you fall through the ice or fall into the icy waters off Kodiak Island in Alaska:

A. The individual has just broken through the ice, is now gasping for air, panics, sucks in water, and drowns within the first minute or two.

B. They survive the initial gasping for air, but then over the next 10 minutes, their muscles and nerves become cold and ineffective, and they are no longer able to tread water. If they are not wearing a personal floatation device, their head and airway will slip beneath the surface of the water, and they too will succumb to the deep and drown.

C. They manage to hang onto the ice or stay afloat. Over the next hour or so they shiver and slowly cool off. Eventually they will lose consciousness, at which point if their arms, beard, or other part of their anatomy is NOT frozen to the ice, they will slip below the surface and disappear into the depths.

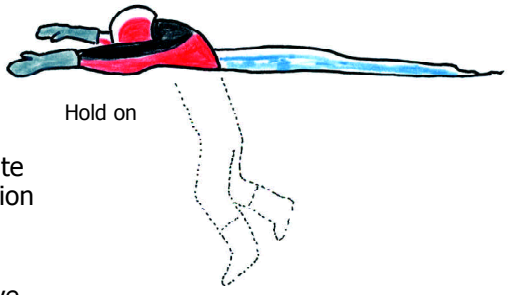
D. They did not panic; they were able to hang on and keep their head above the water even after they lost consciousness (if frozen to the ice). Then and only then, if not rescued in the next hour or two, they may indeed eventually develop severe hypothermia and "freeze to death."



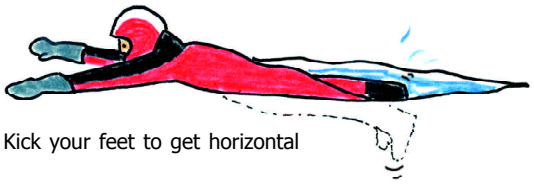
Professor Popsickle (aka Gordon Giesbrecht) summarizes the through-the-ice experience, which, by the way, he has personally undergone many times including on The Late Show with David Letterman, (what a ham), with the expression "1 minute…10 minutes…1 hour…2 hours," to remind us of what happens to humans when they are plunged into very cold water (i.e. 32^0F or 0^0C).

1 Minute — Ten minutes — 1 Hour — 2 Hours

One Minute to Control Your Breathing. The initial reaction is a gasp reflex, where for about one minute the individual will gasp for air in reaction to the cold water. As the cold reaches the skin, the peripheral vasculature vasoconstricts forcing the blood in the skin back into the body core which creates an insulating barrier against the cold. The trick is not to panic and start thrashing about. Just slowly tread water or grasp the edge of the boat or ice to keep you head above the water. After approximately one minute the gasping will calm down, the skin will become numb, and the sensation of intense cold will decrease.

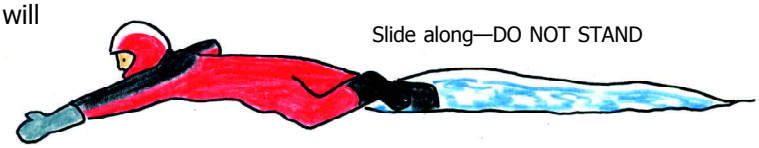

Hold on

Ten Minutes of Meaningful Movement. Now you have about 10 minutes to get out of the water. Gordon has worked out a simple method to help you get up onto the ice. Keep your hands and arms on the ice and kick your feet. This will bring your body to a horizontal position, parallel to the ice surface. "KICK AND PULL." Once horizontal, kick with your feet while pulling with your hands. You will be able to propel yourself up onto the ice. I would suggest that at this point, you should not stand up as the ice may not support your weight. Instead, try to keep your weight spread out as you roll, crawl, and slide across the ice until you know it will support your weight.


Kick your feet to get horizontal


Kick and pull

One Hour Before You Become Unconscious. If you were unable to get out of the water, after 10 minutes or so, the muscles in your arms and legs will become progressively useless due to heat loss in the extremities. Consequently, you will not have the strength to get out of the water. Unless there is someone else to help, you're stuck. All is not lost, however. You will feel pretty numb and you will shiver (this is our normal physiological response to the cold, an effort to produce more heat than we are losing). You will remain conscious for about one hour. How long you remain conscious depends upon the clothing you are wearing, energy stores, and body build. Eventually you will lose consciousness as your body core temperature decreases to about 86º F (30ºC). Unless you slip below the surface and drown, you are still a long way away from death due to hypothermic cardiac arrest (core temperature below 82.4ºF/28ºC).


Slide along—DO NOT STAND

Two Hours to Be Found. If you lose consciousness but do not slip below the water, you can still be successfully rescued if you are found within two hours or so. So, forget that old myth that you only have ten minutes if you fall into ice-cold water—that myth has been BUSTED.

Myth #2

If your feet are cold, cover your head because you can lose up to 75% of your body heat through your head alone.

The problem is that the head is only about 10% of the body surface area. Thus, the head would have to lose about 40 times as much heat per square inch or centimeter compared to the rest of the body.

Gordon had heard this statement one too many times and finally decided to see if this was indeed true. So he took several test subjects, all volunteers, of course, (you have to wonder what problem they caused at the university), wired them to monitor their core temperatures, and discovered that we do indeed lose heat through any exposed part of the body and the amount of heat we lose depends on the amount of exposed surface area. The rate of heat loss is relatively the same for any exposed part of the body, not simply the head. You do not lose heat significantly faster through the scalp than any other portion of the body with the same surface area.

It is still a good idea to put on a hat (a hood really - what insulation does a baseball hat have?) if your feet are cold. But what is BUSTED is that there is nothing peculiar or unique about the head. The idea that we lose heat faster through out scalp, because of the constant blood supply to the brain, is simply a myth. (One that I personally have believed for many years.)

Myth #3

Warm water or a cup of tea will keep you warmer than a cold orange juice or a soda.

There are many variations and opinions on what is the best thing to drink to keep you warm or to warm you up when you are cold. This is one of the questions that Murray had to answer in his long career at the Army Research Institute in Environmental Medicine lab, ARIEM. It was essential for the military not only to know how to keep personnel warm, well-fed, and well-hydrated in the cold, but also, if troops became cold, what was the most effective way to rewarm them.

As it turns out, the real answer has little or nothing to do with the temperature of the liquid, but it has everything to do with the amount of calories or sugar that is in the drink. (Oh no, not those horrible, deadly, disfiguring carbohydrates.) Sugar, i.e. carbohydrates, is the log that is thrown on the fire in each cell to provide fuel, heat, and to power life. Glucose and fructose, two of the simplest sugars, are burned in the mitochondria, a small organelle in each cell, to provide that cell with the energy to drive the engine of life. I hate to say it, but without carbohydrates there is no life. Carbs are your friend.

We are 70% water

As far as the temperature of the liquid is concerned, it is more comforting to drink a warm liquid in the cold. But, think of the physics. Take an average man, weighing about 170pounds (80kg). Since we are 70% water, that 170pound (80kg) man is 120pounds (56kg) of water or 15 gallons (56liters) of water (one gallon of water weighs 8 pounds). So, if you were to take 1 quart (1 liter) of hot tea water at 110ºF (43.3ºC) and pour it into 15 gallons (56liters) of cool water at 90ºF (32.2ºC), it will raise the temperature from 90ºF (32.2ºC) to 90.3ºF (32.4ºC), not enough to make a clinical difference. But, if instead, you throw into that 170pound (80kg) man, 1 quart (liter) of a fluid containing sugar, now he has fuel to put into the furnace to burn, to get warm, stay warm, shiver, function, survive, and thrive.

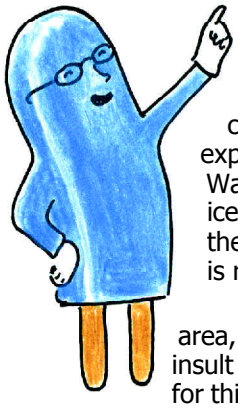
BUSTED - it is not the temperature of the liquid but the calories of sugar in the drink that will keep you warm. There is nothing wrong with a warm drink that you can wrap your cold hands around. But it is important to remember that carbohydrates are your friend. They provide the energy for life. (Remember, we're talking <u>real</u> sugar, not artificial sweeteners or sugar substitutes.)

Myth #4

Rubbing frostbite is the proper, and best way, to rewarm frozen body parts.

For years this is one of several rewarming methods that has proven to not only be wrong, but also to be very detrimental to the patient. This myth goes along with several others that all deserve to be BUSTED at once. These include rubbing the frozen part with snow or ice and rewarming the frostbitten part with dry heat from a fire, stove top, hot exhaust air from an engine, or any drying device.

Let's take a finger, for example. When that finger begins to cool off, the local vasculature will vasoconstrict decreasing the circulation to that area. This reduction in circulating blood not only allows the area to cool faster but also prevents sufficient oxygen from getting to this tissue. The cold sensory nerves shut down causing a feeling of numbness followed by the loss of sensation. This initial phase is referred to as frostnip or 1st degree frostbite, and if caught at this point should be very easy to rewarm with the resultant return of full function.



If this numbness or loss of sensation is ignored, the tissue will continue to cool off and eventually begin to freeze. As the water in the cells cools, it begins to expand. Water is the only known substance that expands as it cools to a solid and then continues to expand. Water is most dense at 40ºF (4ºC). As it continues to cool, it will continue to expand and freeze. (This is why ice floats.) As the water expands and cools, small ice crystals will form. If nothing is done about it at this point, the finger will go on to freeze solid. As the ice forms in the cells, it expands and bursts the cells. If the finger is rewarmed before it is solid, a large blister called a bleb will form with rewarming.

The problem with rubbing cold, numb parts is the ice crystals. If they have formed, as you massage the area, they will act like microscopic razor blades and shred the cells. Rubbing the cold tissue with snow only adds insult to injury and using hot air to rewarm will dehydrate the tissues and cause mummification. All equally bad for this cold finger.

All of these rewarming techniques are BUSTED. So, what should you do? First examine the area and determine if this is superficial or deep frostbite. Superficial, 1st or 2nd degree frostbite, will initially look the same. While the area will be numb and the skin pale or waxy due to vasoconstriction, the tissues will still be pliable. The difference between 1st and 2nd degree will

become apparent once the areas have thawed out. 1st will return to normal, and 2nd will either appear bruised or more likely will form a large blister called a bleb.

In the field superficial frostbite should be rewarmed with gentle skin-to-skin contact, where the cold area is placed against warm skin. Once rewarmed, it should be examined closely for bleb formation. If a bleb occurs, protect the area well as the bleb cannot be allowed to refreeze, since this will cause complete tissue destruction.

Deep or 3rd degree frostbite is grossly obvious in that the tissue is ivory white and frozen solid. The area should be insulated to protect from further injury. We do not recommend that you try to field rewarm deep frostbite. The tissue damage has already occurred, and you can only make things worse.

Myth #5

Hypothermia is a disease, the severity of which can be determined by the amount of shivering, and shivering is bad.

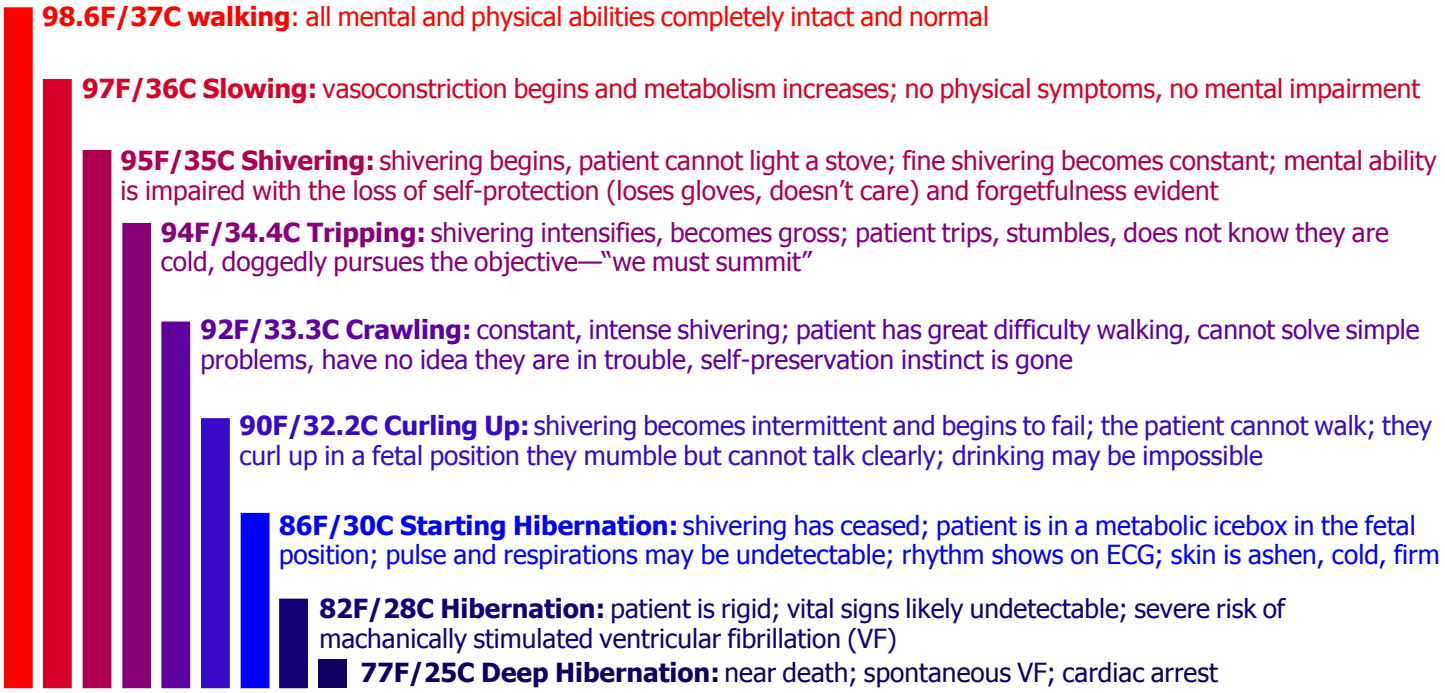
Here we have several myths bundled into one. The first myth is that hypothermia is a disease. It is not. The important thing to remember is that the individual suffering from a lower than normal core temperature, hypothermia, has normal physiology for that temperature. As long as we do not mess with their physiology, then, with proper support, they should return to normal core temperature without complications. Quite often the most important skill in managing the hypothermic is benign neglect. This means that you need to thermo-protect them so that they retain more heat than they are losing, and you need to maintain blood sugar to keep them shivering.

One very effective way to rewarm a mildly hypothermic patient (who will be shivering vigorously) is shivering itself. Shivering is contraction and relaxation of the skeletal muscles simply to produce heat. A shivering individual, if properly packaged, should rewarm at a rate of about 2ºF per hour. Shivering, along with mental status and the ability to walk, can help to determine core temperature.

So, shivering is good; it is a normal physiologic reaction to a decreasing core temperature. It is our effort to remain warm or produce the heat necessary to regain normal core temperature. Shivering is good, but there is a trick. To keep shivering, you have to have energy to burn - those darn carbohydrates again.

In a well-fed state, at rest, you have about 24 hours of stored glucose in your liver, called glycogen. If an individual is shivering, these glycogen stores will be consumed faster than at rest. The stores will probably last about 6 – 10 hours. Then as the blood sugar level drops, the shivering mechanism will fail, simply because there are not any more logs to throw on the fire. So, in order to keep the hypothermic victim shivering, you have to maintain their blood sugar. If they are conscious, this can be maintained by feeding them a warm, not hot, sickly sweet liquid (again the "sweet" must be real sugar.)

BUSTED - Hypothermia is not a disease - it is a condition that is brought on by a lower than normal core temperature, and the physiology is normal for that core temperature. Shivering is good; it is the safest and most efficient way to rewarm. And, once again, carbohydrates are your friend - they are the logs you throw on the fire to keep the fires burning.



Myth #6

You should never actively rewarm a hypothermia victim in the field because you could cause massive peripheral vasodilation, cardiovascular instability, and ventricular fibrillation.

If a patient is really hypothermic, there will be a substantial central drive for peripheral vasoconstriction, and muscle blood flow will be very low because of low tissue temperature and metabolism. Gordon has tried to heat the arm of a hypothermic subject with a warm water blanket. After quite a while with no effect on core rewarming, he removed the water blanket. The pattern of the water blanket was etched into the subject's arm in 1st degree burns (this resolved in a day so no damage was done). The reason for the minor burn was that a considerable amount of heat was being delivered to the arm, but there was no vasodilation to enable blood flow to take the heat away from the skin. Thus the skin sustained a minor burn.

Likewise in the field, none of the heat sources that would be available would be able to cause significant vasodilation until core rewarming had occurred. The only exception is if you go to someone's cabin and put your patient into a tub of warm/hot water. Then you COULD cause a massive increase in peripheral blood flow and ultimately death.

Other heat sources like warm water bottles, warm bodies, electric heating blankets, or forced air warmers (these could operate in an ambulance or aircraft) would not pose a threat to the patient and would be advised as any help to warm the heart is beneficial. The most efficient portable heat source that Gordon has studied is the Norwegian Charcoal Heatpac. It produces 250 watts which would be very helpful to warm an insulated patient. (A Google search will lead you to several articles about this amazing little device.)

BUSTED - Other than a tub of warm/hot water (which you should never put a patient in), there are no sources of heat that will cause rapid, massive vasodilation and its disastrous complications. A hypothermic patient has intense central demand to remain vasoconstricted, and this will only be reversed in a gradual way, and only as the core temperature increases. In hypothermia, the heart stops as a result of low temperature and the time it spends at that low temperature. It only makes sense that gradually warming the heart has to be more healthy than keeping it low.

Myth #7

Frostbite is rarely associated with hypothermia.

This myth is interesting because it flies in the face of common sense. If an individual has a lower than normal core temperature with decreased circulation to the skin, it is a set-up for frostbite. As they continue to cool off, circulation to the extremities becomes more and more impaired. So, the lower the core temperature, the greater the risk for severe frostbite.

BUSTED - The lower the core temperature, the greater the risk for frostbite. When managing a hypothermia victim, be sure to use heat packs on their hands and feet, cover their head, and monitor their extremities for signs of frostbite.

Myth #8

Hypothermia is an absolute emergency.

This is a typical mindset for both rescue as well as emergency department personnel. It is important for us to remember that hypothermic patients have normal physiology for their core temperature. They are very stable, if handled properly, and there is no need to hurry unnecessarily. In fact, rushing to do something is probably the worst thing to do.

BUSTED - Hypothermia is a medical condition that needs to be treated properly to help these patients regain normal core temperature. But, it is not an emergency; time is on their side.

Myth #9

If a hypothermia victim is found pulseless and breathless, you should immediately begin CPR and access ACLS as soon as possible.

There are several problems with this myth. The first: is the patient truly breathless and pulseless or simply in a metabolic icebox due to a low core temperature? The human body will continue to shiver, in an effort to rewarm itself, until its core temperature has dropped below 86ºF (30ºC), or until it runs out of blood sugar (fuel to burn) which typically takes many hours.

As the core temperature drops below 90ºF (32ºC), shivering will occur in short bursts and slowly fail completely around 86ºF (30C). At this point patients go into a state of suspended animation, similar to a hibernating bear. Respirations slow to 3 – 6 per minute, the demand for O_2 greatly decreases because of the slowed metabolism, and the heart rate also slows to about 40

beats per minute. Respirations, being very slow and shallow, are difficult to observe; the heart rate has slowed; blood pressure has dropped; and the blood is now 190% thicker than normal making it very hard to palpate a pulse and impossible to hear the heart valves close. So, the patients may appear breathless and pulseless when they are not. They will most likely be curled up into the fetal position to help protect core temperature. If you gently pull on their arm, it will slowly extend, and if you let it go, it will curl back in, because it takes life to contract a muscle.

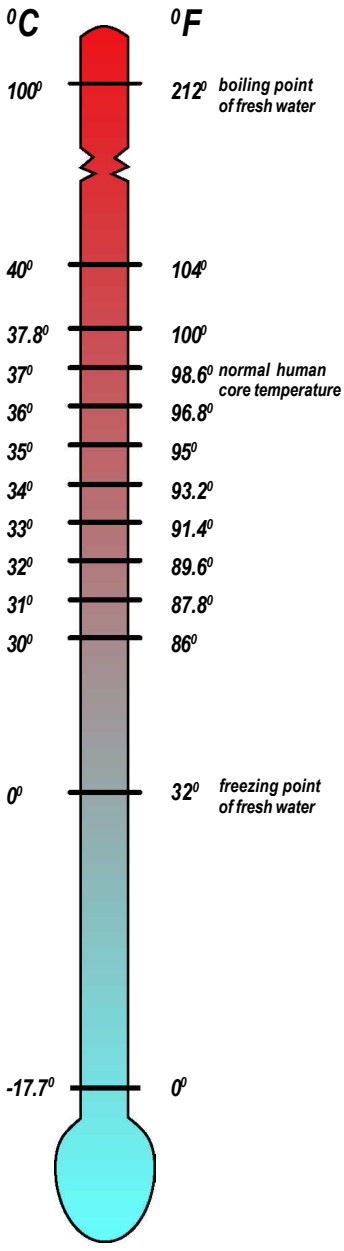
If you place a cardiac monitor on these folks, it will show a sinus bradycardia possibly with Osborn, "J" waves. Do not misinterpret this as pulseless electrical activity. The problem is simple: once you begin CPR, you will most likely cause ventricular fibrillation. The cold myocardium is very fragile and does not like to be jostled and bumped around.

If they go into ventricular fibrillation, you have a major problem because it is very hard to defibrillate a cold heart through a cold chest wall. Additionally, no one knows how cardiac medications behave in these cold temperatures. All medication research is done at normal core temperature so we do not know how these drugs will react at subnormal core temperatures. Circulation is very poor at best, so any ACLS drugs given tend to first accumulate in the central circulation, then are released as a bolus causing a drug overdose as the patient approaches normal core temperature.

BUSTED - Do not begin CPR unless you are certain that they are in asystole or ventricular fibrillation. Once you do start CPR, you have now set the clock to definitive care because if they are not there already, they will most likely go into ventricular fibrillation from the chest compressions.

So, what should you do? First and foremost, DO NOT HURRY. Handle the patient gently as rough handling can precipitate ventricular fibrillation. Protect them from the environment, and place them in a hypothermia wrap. If conscious give them warm, sickly sweet fluids; if unconscious, do gentle, slow rescue breaths, one every 10 seconds. This will provide them with warm (98.6ºF/37ºC), moist (100%) air. Remember that the rescue breaths need to be long and slow as the chest wall is cold and slow to expand.

Temperature Conversion Celsius^0 and Farenheit^0



Celsius: $C^0 = 5/9(F^0-32)$
Farenheit: $F^0 = 9/5C^0+32$

Freezing Point of Water: $0^0C = 32^0F$
Boiling Point of Water: $100^0C = 212^0F$
100^0C change = 180^0F change

For each 1^0C change there is a 1.8^0F change (180/100)
For each 1^0F change there is a $.55^0C$ change (100/180)

Myth #10

They are not dead until they are warm and dead.

This is always an interesting statement that does require a certain amount of common sense. In other words, there are limits. If you pull someone out from under the ice after 18 hours or dig them out of an avalanche after 24 hours, there is no hope of resuscitation.

Always, always, always, keep the rescue team in mind. Do not put their lives at risk in a heroic, dramatic resuscitation effort when the chances of recovering are zero.

BUSTED - It is a nice dramatic-sounding maxim, "not dead until warm and dead," but if they are found dead and have been dead for a while, they will remain dead. Please, do not put the lives of others at risk to appear to be a hero. Remember, as Murray Hamlet says: "You're never dead until you are warm and dead…unless you are cold and dead."

Myth #11

The best way to rewarm a hypothermia victim is to place them naked in a sleeping bag with a warm naked rescuer so they can share body heat.

BUSTED - The hypothermia victim is cold and vasoconstricted so they will not absorb heat through their pale, cold skin. The second problem occurs when the warm rescuer begins to overheat and sweat. They will now get the hypothermia victim damp which will increase heat loss.

Remember, one very effective way to rewarm a mildly hypothermic victim (who is shivering vigorously) is to keep them shivering and harness the heat with adequate insulation. Concentrate your efforts on getting them dry and keeping them dry. Put them in a good thermal capsule, a hypothermia wrap, and feed them sickly sweet liquids to maintain blood sugar. If unconscious, do not try to feed them, and do your best to provide an external source of heat.

Myth #12

There is no such thing as "after drop" while rewarming a hypothermia victim.

BUSTED - Both Murray and Gordon have clearly shown in their research that we can anticipate that as the hypothermia victim is rewarmed, initially their core temperature will continue to drop another degree or more before they turn the corner and begin to rewarm. This is caused by blood-flow being re-established to the colder peripheral circulation. As this blood cools in the periphery and returns to the core, it will cause a temporary drop in core temperature.

Myth #13

Exposing the patient to remove cold, wet clothing will cause a large drop in their core temperature.

I have heard it stated many times that you cannot strip a person out of their cold, wet clothes in the field because this will cause their core temperature to plummet. This simply is not true. These patients are already vasoconstricted in the peripheral circulation, (i.e. the skin), so unless they are allowed to lie around naked for 10 minutes, they are not going to cool off. It is much more important for them to be dry and reinsulated with dry clothing than to remain cold and wet.

I have heard it taught in the past that you should leave them wet, that they will warm the water next to their skin and will stop losing body heat, just like in a wet suit. First of all, you do continue to lose heat in a wet suit; it is just slower than without it. As long as these patients are damp, moist, or wet, they will continue to lose heat much more than if they are dry.

BUSTED - Hypothermics have to be dry to be warm. Do not hesitate to strip them out of wet, moist, or damp clothing, right down to their bare skin, and then protect them with dry clothing or insulation.

Short Biographies of the MythBusters

Gordon Giesbrecht, PhD is a professor of thermophysiology and the Director of the Laboratory for Exercise and Environmental Medicine at the University of Manitoba. He has authored over 100 articles on cold physiology. An excellent speaker and educator, considering the number of times he has been intentionally hypothermic, he also has a great sense of humor. He has been known to refer to the lower 48 states of the US as "the Canadian provinces still occupied by those Americans."

Murray Hamlet, DVM is considered to be one of the foremost experts in hypothermia, frostbite, and nonfreezing cold injuries. Although retired (and working harder than ever), Murray spent 32 years at the Army Research Institute in Environmental Medicine (ARIEM) in Natick, Massachusetts studying the limits of human physiology. He defined and refined the techniques that we use today in rescuing and treating cold injury patients. He is a very popular and informative speaker always in great demand. His remarkable sense of humor is reflected in things such as "Hamlet's postulates," a list of "wise" statements like, "they are not dead until warm and dead, unless, of course, they're dead."

Frank Hubbell, DO is co-founder and co-executive director of SOLO (with his wife Lee), a school of wilderness emergency medical training. It is at SOLO where he has developed, taught, and refined the Wilderness First Aid, Wilderness First Responder, Wilderness EMT and Wilderness EMT Module programs for the past 28 years. For the past 30 years he has taken all the information produced by Murray and Gordon and put it to work in the field providing patient care on town rescue, ski patrol, and mountain rescue. When mistaken for either Murray or Gordon, he is happy to share the credit for any of their great contributions to providing patient care.

New Subscription & Renewal Form

Wilderness Medicine Newsletter

The newsletter is an online journal published six time each year. The subscription rates are as follows:

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____ Two-years (12 issues) **$25**

____ Three-years (18 issues) **$30**

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"But a certain Samaritan, who was on a journey, came upon him; and when he saw him, he felt compassion, and came to him, and bandaged up his wounds, pouring oil and wine on them; and he put him on his own beast, and brought him to an inn, and took care of him."

Luke 10:43 (NAS)

The Wilderness Medicine Newsletter is dedicated to all the good Samaritans who do not hesitate to help those in need.

TMC books

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___ Sept./Oct. '04	The Agony of the Teeth
___ July/August '04	Heart Attack in the Backcountry
___ May/June. '04	Level of Consciousness: Part 2
___ Mar/Apr. '04	Level of Consciousness: Part 1
___ Jan./Feb. '04	When Jack Frost Bites: a personal story
___ Nov./Dec. '03	The Performance Triad: hydration, fuel, pacing
___ Sept./Oct. '03	Musculoskeletal Injuries Part 3
___ July/August '03	Lightning: Beauty & Beast
___ May./June '03	Musculoskeletal Injuries Part 2
___ Mar./Apr. '03	Musculoskeletal Injuries Part 1
___ Jan./Feb. '03	Field Weather Forecasting
___ Nov./Dec. '02	Behavior Meds in the Backcountry
___ Sept./Oct. '02	Problems with the Pump
___ July/Aug. '02	Staying Well in a World of Disease
___ May/June '02	The World of Infectious Disease
___ Mar./Apr. '02	Managing Backcountry Fatality
___ Jan./Feb. '02	History of Wild. Med. schools
___ Nov./Dec. '01	Drugs in the Backcountry
___ Sept./Oct. '01	Wilderness Rescue in Winter
___ July/Aug '01	Diabetes in the Wilderness
___ May/June '01	Poison Ivy, Oak, Sumac
___ Mar./Apr. '01	Don't Blame Montezuma
___ Jan./Feb. '01	Have You Ever Wondered Why?
___ Nov./Dec. '00	Got the Travel Bug?
___ Sept./Oct. '00	Stonefish, Sea Snakes, and...
___ July/Aug. '00	Leadership in Prevention...
___ May/June '00	Sunscreen Controversy
___ Mar. /Apr. '00	Unraveling Abdominal Pain
___ Jan./Feb. '00	Lions &Tigers & Bears
___ Nov./Dec. '99	Breathing Hard in Backcountry
___ Sept./Oct. '99	Oh, My Aching Feet
___ July/Aug '99	Children in the Mountains
___ May/June '99	Critical Incidents
___ Mar./Apr. '99	Anaphylaxis
___ Jan./Feb. '99	Tendinitis
___ Nov./Dec. '98	Gender Specific Emergencies
___ Sept./Oct. '98	GPS (Global Positioning)
___ July/Aug. '98	ISMM Discussion Case
___ May/June '98	The Charcoal Vest—Hypothermia
___ Mar./Apr. '98	ALS in the Backcountry
___ Jan./Feb. '98	Avalanche Awareness
___ Nov./Dec. '97	Medecine Sans Frontieres
___ Sept./Oct. '97	Water, Water, Everywhere; Death in Backcountry

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01/24/05	01/28/05	WEMT MODULE	SOLO, NH	603-447-6711
02/22/05	02/26/05	WEMT MODULE	SOLO, NH	603-447-6711
03/28/05	04/01/05	WEMT MODULE	SOLO, NH	603-447-6711
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01/08/05	01/09/05	WFA + CPR	HULBERT OUTDOOR CENTER, VT	802-333-3405
01/15/05	01/16/05	WFA	DARTMOUTH OUTING CLUB, NH	603-646-3512
01/15/05	01/16/05	WINTER MEDICINE	HULBERT OUTDOOR CENTER, VT	802-333-3405
01/22/05	01/23/05	WFA	AMC-PINKHAM, NH	603-466-2727
01/22/05	01/23/05	WFA	INDIANA UNIVERSITY OUTDOOR ADVENTURES, IN	812-855-2231
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01/22/05	01/23/05	WFA	UNC-A, ASHEVILLE, NC	828-251-6368
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02/11/05	02/13/05	WFA + CPR	COLLEGE OF DUPAGE, IL	630-942-2787
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03/26/05	04/03/05	WFR	HARVARD FOP, MA	617-495-7935
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02/11/05	02/11/05	WILD DAY	SOLO, NH	603-447-6711

KEY: AWFA: Advanced Wilderness First Aid • WEMT: Wilderness Emergency Medical Technician • EMT/RTP: Refresher Training Program • WFR: Wilderness First Responder