

Hypothermia

In your body, heat is produced constantly through muscle activity and your metabolism.

If there was no way to lose heat, your body would warm up more than 1°C per hour.

Luckily, under normal conditions there is a balance in heat production and heat loss, resulting in a constant body temperature (36.5-37.5°C). If your body loses more heat than it produces it will cool down and the body temperature will drop. To understand the risks of hypothermia and to find ways to prevent it, it is important to understand how your body loses heat. There are 4 processes of heat loss:

- **Radiation:** heat radiating from your skin, the same process that makes your hands warm up close to (but not touching) a fire
- **Conduction:** heat moving from your skin to a medium it touches, such as contact with sand, ice, water, etc)
- **Convection:** heat being transported away from your body by a moving medium it touches (moving water, moving air etc.). The more movement, the faster you cool down. This essentially explains windchill, or the way wind makes it feel a lot colder than it actually is.
- **Evaporation:** when a liquid (water, sweat, tomato ketchup, whipped cream) dries up it changes state from liquid to gas. This process draws energy and thus cools down the medium it is on. This process is depending on the amount of liquid, temperature and wind. Be aware that wet clothes (lycra, boardshort) result in a constant heat loss through evaporation, so wearing a lycra or boardshort(?) over your wetsuit makes you lose more heat.

If you lose more heat than your body produces, you will cool down. If you cool down beyond 35°C it is called hypothermia. All your organs are designed to work optimally at around 36-37°C and when the temperature decreases (or increases) beyond this range they will more and more lose function. Two of the most important organs to remember are your brain and heart, because their function is very important in your life.

If you know how to recognise hypothermia you will be able to help yourself or your buddy and avoid getting into the danger zone.

Hypothermia stages

It is important to understand a couple of principles. First, measuring temperatures may be difficult when you are at the beach, most of us never bring a thermometer to the spot. Second, normal thermometers will become unreliable when the body temperature drops beyond 35°C. That is why no degrees have been mentioned, but the important signs:

Stage 1: Victim is **conscious, shivering**

He might have a slurred speech and slightly impaired brain functions: clumsy, impaired risk assessment (like being a little bit tipsy)

Stage 2: victim is **conscious** but sleepy, feels cold but does **not shiver** anymore. They will show clearer signs of an impaired brain function (sleepy, very clumsy, strange behaviour). This is where the danger zone starts: from this the **heart is vulnerable for rhythm disorders, that can be provoked by sudden movements** like rubbing (trying to warm your patient), driving fast over a bumpy road, etc.

Stage 3: victim is unconscious.

He/she is still breathing and a pulse can be found, but it is very slow and/or weak (so sometimes it takes a very long time to find one).

Stage 4: victim unconscious

No pulse or breathing can be found

These stages are important for you to remember, so you can take the correct actions. But before you help someone else, make sure you don't put yourself in danger (so don't take off all your warm clothes to help someone, then end up with hypothermia yourself).

What to do:

Stage 1: Get the victim out of the cold

Find shelter from wind and cold or better yet: get them inside where it is warm and dry. If possible, remove wet clothes and get them into dry ones or wrap into something dry. If the victim can, let them drink something warm with sugar. Sugar will replenish low blood sugar caused by the initial vigorous shivering.

Never pour it into their mouth if they cannot drink by themselves or it will go right into the lungs! Also very important, alcoholic beverages will not help. This in fact makes you lose more heat. It may give a warm sensation but it actually will make the vessels in your skin become wider (just like when you are working out in hot temperatures).

Stage 2-4: call in professional help (for example an ambulance)!

Get the victim out of the cold: find shelter from wind and cold or better yet: get them inside where it is warm and dry. If possible, remove wet clothes and get them into dry ones or wrap into something dry. Avoid sudden movements. When you cannot find breathing: start CPR immediately and get help.

The 1-10-1 Rule

Another important effect that cold water can have (more important for sailors), the direct effect on your body (very well explained by this (ultra modern) youtube movie <https://www.youtube.com/watch?v=96YEPAdA2Y>)

It is summarized by:

- Cold shock (0-2 minutes): uncontrolled breathing, panic.
- Cold incapacitation (5-15minutes): cold muscles make fine motor skills (opening zippers, knots) increasingly difficult, and in later stage even impairing skills like walking and swimming.

For this reason the 1-10-1 rule can be helpful when getting into trouble in cold water.

1. Take one minute to control breathing
2. Use the next 10 minutes for fine motor skills: zippers, buttons, safety releases, flares.
3. In cold conditions you have about one hour before the cold makes your consciousness will lower.

Naturally all of these times are dependent on how cold your environment is and how well your clothing protect you.

Summary:

By understanding how the body loses heat, you can easier remember how to prevent heat loss. The colder one gets, the more body functions will seize to work properly. If you go out in cold conditions and you find someone behaving in a weird manner, please remember that this person could suffer from hypothermia. Get any cold victim out of the water into a warm environment. Get help when in doubt, but especially when this patient is or becomes unresponsive or has no apparent pulse.