

# HYPOTHERMIA

## Your Body Core Temperature

Heat is both required and produced at the cellular level. The environment acts as either a heating or a cooling force on the body. The body must be able to generate heat, retain heat, and discharge heat depending on the body activity and ambient external temperature.

Body temperature is a measure of the metabolism - the general level of chemical activity within the body.

The hypothalamus is the major center of the brain for regulating body temperature. It is sensitive to blood temperature changes of as little as 0.5 degrees Celsius and also reacts to nerve impulses received from nerve endings in the skin.

The optimum temperature for chemical reactions to take place in the body is 98.6 degrees F.

Above 105 F many body enzymes become denatured and chemical reactions cannot take place leading to death.

Below 98.6 F chemical reactions slow down with various complications which can lead to death.

## Core

the internal body organs, particularly the heart, lungs, and brain.

## Periphery

the appendages, skin, and muscle tissue.

Core temperature is the temperature that is essential to the overall metabolic rate of the body. The temperature of the periphery is not critical.

## How Your Body Regulates Core Temperature

### Vasodilation

Increases surface blood flow, increases heat loss (when ambient temperature is less than body temperature).

### Vasoconstriction

Decreases blood flow to periphery, decreases heat loss.

### Sweating

Cools body through evaporative cooling

### Shivering

Generates heat through increase in chemical reactions required for muscle activity.

Visible shivering can maximally increase surface heat production by 500%.

However, this is limited to a few hours because of depletion of muscle glucose and the onset of fatigue.

Increasing/Decreasing Activity will cause corresponding increases in heat production and decreases in heat

production.

## Behavioral Responses

Putting on or taking off layers of clothing will result in heat regulation

## Hypothermia

"A decrease in the core body temperature to a level at which normal muscular and cerebral functions are impaired."

## Conditions Leading to Hypothermia

- > Cold temperatures
- > Improper clothing and equipment
- > Wetness
- > Fatigue, exhaustion
- > Dehydration
- > Poor food intake
- > No knowledge of hypothermia
- > Alcohol intake - causes decreased blood flow leading to increased heat loss

## What are "hypothermia" temperatures

- > Below freezing
- > 40 degrees - Ex. , wind and rain
- > 60 degrees - Ex. Rayanna and hurricane
- > Any temperature less than 98.6 degrees can be linked to hypothermia (ex. hypothermia in the elderly in cold houses) or peripheral circulation problems such as trench foot

and frostbite.

### Signs and Symptoms of Hypothermia

Watch for the "-Umbles" - stumbles, mumbles, fumbles, and grumbles which show changes in motor coordination and levels of consciousness

Mild Hypothermia - core temperature 98.6 - 96 degrees F

- Shivering - not under voluntary control
- Can't do complex motor functions (ice climbing or skiing) can still walk & talk
- Vasoconstriction to periphery

Moderate Hypothermia - core temperature 95 - 93 degrees F

- Dazed consciousness
- Loss of fine motor coordination - particularly in hands - can't zip up parka, due to restricted peripheral blood flow
- Slurred speech
- Violent shivering
- Irrational behavior - person starts to take off clothing, unaware s/he is cold
- "I don't care attitude" - flattened affect

Severe Hypothermia - core temperature 92 - 86 degrees and below (immediately life threatening)

- Shivering occurs in waves, violent then pause, pauses get longer until shivering finally ceases - because the heat output from burning glycogen in the muscles is not sufficient to counteract the continually dropping core

temperature, the body shuts down on shivering to conserve glucose

- Person falls to the ground, can't walk, curls up into a fetal position to conserve heat
- Muscle rigidity develops - because peripheral blood flow is reduced and due to lactic acid and CO2 buildup in the muscles
- Skin is pale
- Pupils dilate
- Pulse rate decreases
- at 90 degrees the body tries to move into hibernation, shutting down all peripheral blood flow and reducing breathing rate and heart rate.
- at 86 degrees the body is in a state of "metabolic icebox." The person looks dead but is still alive.

### Death from Hypothermia

- Breathing becomes erratic and very shallow
- Semi-conscious
- Cardiac arrhythmias develop, any sudden shock may set off Ventricular Fibrillation
- Heart stops, death

### How to Assess if someone is Hypothermic

- If shivering can be stopped voluntarily = mild hypothermia
- Ask the person a question that requires higher reasoning in the brain (count backwards from 100 by 9's). If the person is hypothermic, they won't be able to do it. [Note: there are also other conditions such as altitude

*sickness that can also cause the same condition.]*

- If shivering cannot be stopped voluntarily = moderate - severe hypothermia
- If you can't get a radial pulse at the wrist it indicates a core temp below 90 - 86 degrees
- The person may be curled up in a fetal position. Try to open their arm up from the fetal position, if it curls back up, the person is alive. Dead muscles won't contract only live muscles.