The Perfect Number for Health 98.6°

by Michael Smith PhD MD Sc

Have you checked your temperature lately?

If you are frequently cold, cannot tolerate drafts or air conditioning, you may suffer from hypothermia (low temperature). This article will explain why maintaining homeothermia is absolutely critical to your health.

Homeothermia means constant temperature. For much of life all mammals and birds perform at a constant temperature; for mammals this is 98.6°F and for birds this temperature is about 102°F. The exception is hibernation, the slowing of physiological function and the drastic lowering of body temperature during deep sleep. Hibernation is quite routine during winter for many rodents and bears, and nightly for birds like our Arizona hummingbirds. The underlying reason for this is not the drop of outside temperature during winter but the lack of food. The exception for bears proves the point: tropical bears do not hibernate, neither do many polar bears. As long as the polar bear can find a seal to eat, it remains outdoors and the body temperature runs at about 98.6°F.

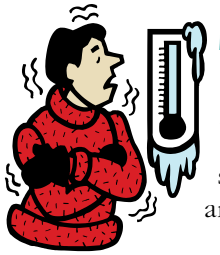
At the moment it seems impossible for humans to hibernate. Irreversible cell damage occurs if the human temperature is lowered below about 88°F for any length of time, factoring in a subject's health, age and monitoring.

There is universal agreement that humans were meant to function at 98.6°F and deviation from this is always serious.

One reason is that *neurons are extremely dependent upon a constant supply of nutrients and begin to malfunction if this supply is even slowed down.* Another reason is that many enzymes of all cells have very temperature-sensitive properties. The catalytic abilities of many enzymes are drastically altered or even quenched entirely if the cell temperature is lowered by even a few degrees. Stop an enzyme and the cell eventually dies.

In addition, critical components of each cell are thousand of proteins made by translation from DNA and RNA, which need to stay hydrated to keep cells alive. Protein hydration is highly temperature dependent. Many proteins become insoluble (clump up) as the temperature is raised. Once these proteins clump up, they cannot function and the cell dies. *Without homeothermia, the very elemental form of all systems in the mammalian body–neurons, organs, tissues, and so forth–are adversely threatened.*

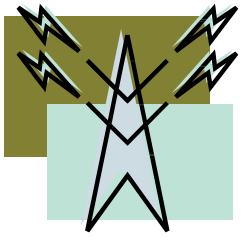
Body heat is generated by three primary methods: mechanical, electrical and chemical. The four major organs generating body heat are the brain (electrical), heart (mechanical), liver (chemical), and kidneys (chemical and electrical).



MECHANICAL. The first method is mechanical friction. As you move your joints and muscles, you create heat. Even with our wonderfully lubricated shoulders, knees and hips we create a fair amount of heat during motion.

Another friction pathway is the heat liberated as our muscle fibers slide across each other during contraction and relaxation. If we are out in the cold without protection we use this process to heat up by shivering. This is simply high frequency, small muscle contractions and relaxations. While capable of liberating an enormous amount of heat, shivering is tiresome and cannot be maintained for long. Another process for mechanical heat liberation is blood circulation. The heart liberates an enormous amount of heat during pumping and red blood cells, sub cells and plasma liberate heat as these slide around the capillaries.

ELECTRICAL. The second method is electrical. The brain and spinal cord are centers of heat production. Heat is generated as the neurons build up electrical charge, then rapidly discharge at the cell surface. This constant charge separation and combination demands an enormous amount of energy and releases large amounts of heat.



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The Perfect Number for Health
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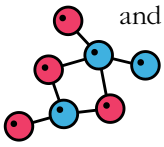
CHEMICAL. The third method is chemical. Research into the problem of chemically created body heat has been sporadic with little government funding but progress is being made. The sub cellular organelles called mitochondria are the sites of ATP production for all cells. ATP (AdenosineTriPhosphate) and related molecules are the intracellular currency. Need to repair DNA? Then you shall pay with several ATP. Need to distribute a hormone signal within the cell? You shall pay with ATP.



ATP is the biochemical most easily and efficiently translated into work energy by thousands of enzymes present within most cells. Mitochondria are quite efficient at producing ATP. About 90% of the possible energy from foods such as citrate, succinate and malate is transformed into potential energy as ATP by the mitochondria. The citrate, succinate and malate are used up with oxygen in the creation of water and carbon dioxide (chemical combustion).

Cold blooded animals like snakes and lizards use this 90% efficiency extremely well because they don't have to spend all of their time finding food. A lizard only needs to eat a large meal about once a week, giving him much more time for lying on warm rocks and enjoying the sun.

> "If you have **low magnesium and low thyroid function**, you will have trouble maintaining **homeothermia** or the perfect number of **98.6º.**"

Warm-blooded animals, on the other hand such as humans, create heat by burning citrate, succinate and malate but do not always generate ATP. Biochemically, this is called *uncoupling* the mitochondria; a short way of stating that chemical combustion occurs in the mitochondria without production of ATP. Another term used is thermogenesis or *heat creation*. All physical scientists will then ask, "How much heat is liberated?" since you cannot have chemical combustion without liberating heat. The answer is "enough to heat mammals from room temperature of 75 to 98.6ºF".

Mammals have the innate ability to hormonally control the method for heat production via the mitochondria via the uncoupling protein (UCP1) in fat tissues. UCP1 is controlled by both the thyroid and norepinephrine[1]. The ability of these two modifiers to control the UCP1 *is diminished in the absence of magnesium*[2]. Low concentration of intracellular magnesium is detrimental as *it reduces the ability of thyroid hormones and norepinephrine to control the heat production by mitochondria*. In short, if you have low magnesium and low thyroid function, you will have trouble maintaining homeothermia or the magic number of 98.6ºF.

Summary

While the healthy mammalian body runs an exacting mechanism for creating energy to regulate body temperature and maintain homeothermia, any disruption of these biochemical reactions and controlling hormonal balance can result in low (or high) body temperature. People who suffer from a magnesium deficiency need to be careful of thyroid levels. Low thyroid and low magnesium levels can lower body temperature with all the terrible side effects associated with metabolic slow down such as poor energy production, fatigue, hypothermia, neurotransmission problems in the brain, spinal chord and muscles, digestive and nutrient transport difficulties. So, take your temperature regularly and check your health!

References

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