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Why 98.6 Degrees Is Not the Normal Body Temperature

Analysis by Dr. Joseph Mercola | November 06, 2023

STORY AT-A-GLANCE

- Your body temperature is vital to maintaining homeostasis, and as it turns out, 98.6 Fahrenheit (37 Celsius) may not be an average body temperature
- Originally, body temperature was determined in 1868 by a German physician, but by 1935 researchers were calling that number into question. A systematic review of the literature in 2002 demonstrated a greater range of normal and studies in 2020 and 2023 showed an "average" temperature was closer to 98.0 Fahrenheit
- Adults should seek medical care if their temperature is over 103 Fahrenheit (39.44 Celsius), but infants and children require medical care sooner. The best measure is the severity of accompanying symptoms of weakness, irritability, muscle aches and loss of appetite
- Your choice of foods can make a difference in how sick you get, which became clear during the COVID-19 pandemic when data showed those who ate a diet high in ultraprocessed foods had a higher vulnerability to infection

Your body temperature is important to maintaining homeostasis and researchers have found that an average temperature is lower than you thought.[1] For more than 100 years, a normal internal body temperature was defined as 98.6 Fahrenheit (37 Celsius).

However, we also know that your normal temperature is affected by several variables, including the time of day, your environment, your hydration status and whether you've been exercising.

Your body temperature can be elevated by an infection, reaction to a shot or medication, allergies, and other environmental factors. When rises in body temperature are caused by a virus or bacterial infection, they're often accompanied by body aches or headaches and called a fever.

Your body regulates temperature in a process called thermoregulation through the hypothalamus that communicates with your sweat glands, bodily fluids, salt concentrations, blood vessels and your skin.[2] Thermoregulation maintains your body temperature within a very small range throughout the day. It turns out that the small range is lower than you may have learned.

Who Says Body Temperature Is 98.6 Fahrenheit?

The most recent study[3] demonstrating body temperature has declined in the last century was published in the Journal of the American Medical Association by researchers from Stanford University. Many of the same researchers participated in a 2020 study,[4] in which the team determined the average temperature had declined since the 1800s.

The original temperature was determined by German physician Carl Reinhold Wunderlich, who published his research in 1868.[5] He was the first to describe fever as a symptom after having taken more than 1 million individual body temperatures from 25,000 patients to determine the average or "normal" body temperature.

He noted that women had temperatures that were slightly higher than men and older individuals had temperatures that were slightly lower than younger people. Researchers began calling those numbers into question as early as 1935.

A 2002 systematic review[6] of the data looked at studies from 1935 to 1999 and summarized the evidence, finding a greater range in normal body temperature. The data also revealed the need to place importance on where on the body the temperature measurement is taken and the patient's gender.

Average Body Temperature Is Slightly Lower Than You Think

The Stanford team published a study[7] in eLife in 2020 in which they explored the trends in body temperature using data sets that covered three distinct historical periods. The data[8] were compiled from military service records, the U.S. National Health and Nutrition Examination Survey 1 and from the Stanford Translational Research Integrated Database Environment.

Researchers included 677,423 measurements and developed a linear model that confirmed trends researchers had found in previous studies. In the newest study,[9] the team questioned if norms could be personalized to improve the clinical application of oral temperature measurements.

They used temperature measurements from 618,306 patient encounters from April 2008 through June 2017. The data were then filtered through the Laboratory Information Mining for Individualized Thresholds (LIMIT) algorithm to remove diagnoses that were over-represented in the high and low ends of the temperature distribution.

Once those diagnoses were identified, they were removed from all encounters. The only diagnosis that was overrepresented in the lower tail was Type 2 diabetes. Outliers in the high-temperature range included diagnosis of cough, acute sinusitis, acute bronchitis and diseases of the urinary tract.[10]

The researchers discovered that the normal body temperature from this data set was 98.0 Fahrenheit or 36.64 Celsius. Temperature varied depending on the time of the day and in this data set, researchers also found a higher temperature in women than men and a lower temperature in older people than younger people.

From the data, they published an online calculator[11] where you or your practitioner can enter parameters including your gender, height, weight and time of day to calculate your expected normal temperature.

Why The Average Temperature Has Likely Dropped

Most are unaware that your body temperature is controlled by your thyroid gland. If you have an impaired thyroid gland your temperature will be lower than normal. In fact, this

was such a reliable indicator prior to thyroid hormone testing that it, along with cholesterol levels, were routinely used to assay thyroid function.

Hypothyroidism will also increase your cholesterol levels. High cholesterol levels are rarely harmful but they do indicate an underlying metabolic anomaly so one would need to do some serious assessment for thyroid function if one has "high" cholesterol levels.

Does a Change in 'Normal' Affect When You Have a Fever?

In the 2020 research,[12] the scientists postulated that the decrease in body temperature may be explained by lower energy use or reduction in metabolic rate. Another explanation offered then and in the 2023 study[13] is that there may be a population-wide decline in inflammation related to improvements in public health in the last 200 years, including improved standards of living and advances in medical treatments.

While the reason that temperatures are declining remains unclear, one question remains — Does this change in "normal" temperature affect when you may have a fever? It turns out that in adults, the temperature that triggers a need for medical attention continues to be 103 Fahrenheit (39.44 Celsius). That number is lower in infants and children as even small rises can indicate a serious infection.[14]

The best measure of illness is the severity of the accompanying symptoms, including weakness, irritability, muscle aches, headache and loss of appetite. As the data from the featured study[15] suggest, health care practitioners may need to pay closer attention to low-grade temperatures in certain segments of the population, such as the elderly and people with Type 2 diabetes.

A different research team undertook an observational study[16] to determine if variations in body temperature could be correlated with measurements of health. The researchers engaged 35,488 patients from an outpatient clinic between 2009 and 2014 who were not seen for an infection and were not prescribed antibiotics.

During the visit, the patient's baseline temperature was measured, and data were controlled for ambient conditions, the body site where the temperature was taken and

the time of day.

In this diverse cohort, the researchers found that older people had the coolest temperature and African American women had the highest. Other comorbidities linked to lower temperature included hypothyroidism; higher temperature was associated with the diagnosis of cancer.

The researchers found that unexplained variations in temperature were significantly associated with mortality and after controlling for all measured factors, the data showed an increase of one standard deviation of individual temperature measurement was associated with an 8.4% increased risk of one-year mortality. The researchers concluded that "Unexplained variation in baseline temperature, however, strongly predicted mortality."[17]

Should You Feed a Fever and Starve a Cold or Vice Versa?

This question of whether to feed a fever and starve a cold or starve a fever and feed a cold has been the subject of much debate. You can tell the difference between a cold and flu by the severity of the symptoms and how high the fever gets. The rule of thumb is that if you feel hungry, then eat, regardless of how high your temperature.

The caveat is if you're vomiting. In this case, it is crucial to remain hydrated and include electrolyte fluids if needed while giving your stomach and gastrointestinal tract a rest.

It turns out your choice of foods can make a difference in how sick you get. This became clear during the COVID-19 pandemic when data showed that those who ate a diet **high in ultraprocessed foods** had a higher vulnerability to a COVID-19 infection that was caused by metabolic dysfunction and harm to the immune system.

Fermented foods and probiotics are the best route to creating an optimal microbiome when they are traditionally made and unpasteurized. Healthy fermented choices include lassi, fermented grass-fed organic milk (kefir), fermented soy or natto and different types of pickled fermentations of vegetables such as cabbage, turnips, cucumbers, onions, squash and carrots.

Using data from the European Food Safety Authority (EFSA) Comprehensive European Food Consumption Database, researchers[18] compared levels of consumption of specific foods against COVID-19 mortality statistics for countries in the database.

The data included the consumption of fermented vegetables, pickled or marinated vegetables, fermented milk, yogurt and fermented sour milk. The researchers also looked at potential confounders, such as gross domestic product, percentage of the population over age 64, unemployment, obesity rates and population density. According to the authors:[19]

> *"Of all the variables considered, including confounders, only fermented vegetables reached statistical significance with the COVID-19 death rate per country.*
>
> *For each g/day increase in the average national consumption of fermented vegetables, the mortality risk for COVID-19 decreased by 35.4%. Adjustment did not change the point estimate and results were still significant."*

Sources and References

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