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Is 37.0 °C still a normal body temperature?

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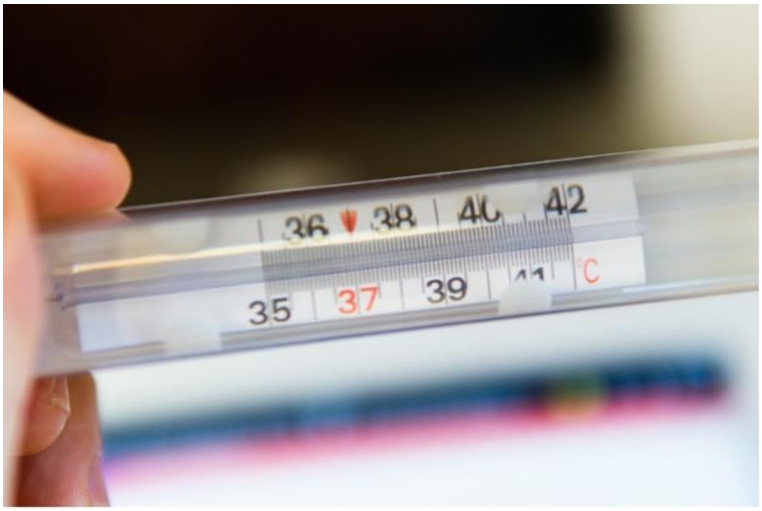
Body temperature has decreased in high-income populations in the last two centuries, calling into question the famous 37°C guideline for normal body temperature. However, a new study shows a significant decrease in body temperature occurred also in a tropical population inhabiting a low-income pathogen-rich environment, raising new questions about the cause of this change.



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Many of us share the same reflex when feeling sick: we measure our body temperature. Indeed, our body raises its internal temperature in response to pathogen infections in order to fight them. The current benchmark for healthy humans, 37.0°C or 98.6°F, dates back to the 19th century when German physician Carl Wunderlich studied body temperature in his patients. However, two centuries later, this might no longer be true.

Recent studies in the United States showed a decrease in the average body temperature to around 36.5 °C (97.7°F) in healthy humans. A possible explanation is that a lower number of infectious diseases in the last centuries leads to a lower overall inflammation level in our bodies hence to a lower temperature. This hypothesis is valid in high-income countries where public health has improved dramatically and life expectancy has increased, but what about low-income countries where infections rates are higher?

In a new study, researchers looked at temperature readings from the population of Tsimane Amerindians of the Bolivian Amazon. This population lives in a highly pathogenic environment, where parasitic and respiratory infections are particularly common. Tsimane Amerindians lack easy access to health infrastructure, even though this situation is rapidly improving. Because of that, the researchers expected the average body temperature to be higher in this population than in high-income countries.

To assess body temperature change over time, about 5000 individuals were followed for 16 years. Their body temperature was taken annually, along with a broad range of other characteristics such as height, weight or presence of parasitic infections and other diseases. The researchers then generated statistical models with the objective of finding which factors influence body temperature. These models also included information on ambient temperature and season when the readings were taken.

Researchers found that the average Tsimane body temperature dropped from 37.0°C in the early 2000s to around 36.5°C almost two decades later. Following the initial hypothesis, these results suggest that Tsimane Amerindians' improving living conditions reduced their exposure to infections. Indeed, their overall inflammation level was lower towards the end of the study period, most likely thanks to the availability of anti-inflammatory drugs such as aspirin or ibuprofen. The rate of health issues and infections, however, remained constant during the study period, except for respiratory diseases, which decreased. However, this alone in unlikely to explain the 0.5°C drop. After all, Tsimane body temperature is currently the same as in the United States while they still suffer more frequently from infections. It's clear that researchers have to look elsewhere.

One of the possible explanations is the greater use of antibiotics: on the one hand antibiotics cure infections, but on the other hand they kill part of the gut flora: less microbes in the gut means less heat produced by them, hence a decrease in body temperature. Another factor could be the access to warm clothes and better insulated houses in cold periods of the year. When the human body is exposed to cold weather, it will increase its metabolism to produce more heat to keep the body warm. Finally, another possibility might be the reduction in physical activity. Because the lifestyle of this tropical population lives is gradually becoming more modern, for example having access to food markets, daily physical activity may be reduced compared to two decades ago. Exercising produces heat during the activity, but also raises body temperature at rest. The authors speculate about many other factors, but as the statistical models did not include them, others studies will have to confirm their impact on temperature.

Importantly, this study suffers from several limitations, for example the type of thermometer used was not the same along the course of the study. Additionally, we know our body temperature can vary during the day, but the time of the day of the temperature reading was not recorded.

In conclusion, this study showed that the decrease in body temperature does not only concern high-income countries with low infection rates like the United States, but also low-income countries. With new body temperature measurements on bigger populations, we might have ultimately to change the 37°C guideline for normal core body temperature.