

98.6 Degrees Fahrenheit Isn't the Average Anymore; Human body has changed over time, new study shows

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FULL TEXT

Nearly 150 years ago, a German physician analyzed a million temperatures from 25,000 patients and concluded that normal human-body temperature is 98.6 degrees Fahrenheit.

That standard has been published in numerous medical texts and helped generations of parents judge the gravity of a child's illness.

But at least two dozen modern studies have concluded the number is too high.

The findings have prompted speculation that the pioneering analysis published in 1869 by Carl Reinhold August Wunderlich was flawed.

Or was it?

In a new study, researchers from Stanford University argue that Wunderlich's number was correct at the time but is no longer accurate because the human body has changed.

Today, they say, the average normal human-body temperature is closer to 97.5 degrees Fahrenheit.

"That would be a huge drop for a population," said Philip Mackowiak, emeritus professor of medicine at the University of Maryland School of Medicine and editor of the book "Fever: Basic Mechanisms and Management."

Body temperature is a crude proxy for metabolic rate, and if it has fallen, it could offer a clue about other physiological changes that have occurred over time.

"People are taller, fatter and live longer, and we don't really understand why all those things have happened," said Julie Parsonnet, who specializes in infectious diseases at Stanford and is senior author of the paper. "Temperature is linked to all those things. The question is which is driving the others."

To test their hypothesis that today's normal body temperature is lower than in the past, Dr. Parsonnet and her research partners analyzed 677,423 temperatures collected from 189,338 individuals over a span of 157 years.

The readings were recorded in the pension records of Civil War veterans from the start of the war through 1940; in the National Health and Nutrition Examination Survey I conducted by the U.S. Centers for Disease Control and Prevention from 1971 through 1974; and in the Stanford Translational Research Integrated Database Environment from 2007 through 2017.

Overall, temperatures of the Civil War veterans were higher than measurements taken in the 1970s, and, in turn, those measurements were higher than those collected in the 2000s.

"Two things impressed me," Dr. Parsonnet said. "The magnitude of the change and that temperature has continued to decline at the same rate."

A complicating factor for the comparisons is that the Wunderlich and Stanford data used different methods and instruments.

Human temperature can be measured in the mouth, armpit, ear or rectum. Ear and rectal temperatures tend to be half a degree higher than oral temperature. Axillary temperature, taken in the armpit, tends to be one degree lower. Wunderlich preferred the axillary method but used a thermometer that was calibrated higher than normal, according to Dr. Mackowiak, who critiqued the work in the Journal of the American Medicine Association in 1992. (He

recommended abandoning Wunderlich's standard.)

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The methods used in Dr. Parsonnet's data vary. The Civil War records could have included a mixture of axillary and oral temperatures taken with mercury thermometers—the researcher couldn't tell for sure. The precision of the instruments is also unknown. The 1970s measurements used readings from oral mercury thermometers exclusively. And the data from the 2000s used digital oral instruments.

Age, time of day, physical activity and other factors, which the researchers couldn't always account for, also affect body temperature.

Still, Dr. Parsonnet is convinced of the validity of the aggregated data.

"Wunderlich did a brilliant job," Dr. Parsonnet said, "but people who walked into his office had tuberculosis, they had dysentery, they had bone infections that had festered their entire lives, they were exposed to infectious diseases we've never seen."

For his study, he did try to measure the temperatures of healthy people, she said, but even so, life expectancy at the time was 38 years, and chronic infections such as gum disease and syphilis afflicted large portions of the population. Dr. Parsonnet suspects inflammation caused by those and other persistent maladies explains the temperature documented by Wunderlich and that a population-level change in inflammation is the most plausible explanation for a decrease in temperature.

Although he doubts the quality of data, Dr. Mackowiak finds this hypothesis persuasive.

"The conclusion is the average temperature of Americans has dropped over that time," Dr. Mackowiak said. "If that observation is real, her explanation is very reasonable."

Given the accumulation of evidence, Frank Rühli, director of the Institute of Evolutionary Medicine at the University of Zurich, who peer-reviewed the Stanford study, suggested the medical establishment should respond.

"Medical norms and guidelines and thresholds for interventions need to be adjusted," Dr. Rühli said. "That is the major issue."

This is important for researchers and physicians who need to make decisions about when and how to treat patients. But for most of us, a thermometer reading matters less than how we feel.

"If you're sick, you're sick," Dr. Parsonnet said, "regardless of your temperature."

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