

# Seasonal temperature impacts patient lab results

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Ambient temperature influences the results of some of the most used laboratory tests, and these distortions likely affect medical decision making, such as whether to prescribe medications, researchers report

December 10th in the journal *Med*. The authors say that laboratories could statistically adjust for ambient temperature on test days when reporting lab results to account for day-to-day variability.

"When a doctor orders a [laboratory test](#), she uses it to shed light on what's going on inside your body, but we wondered if the results of those tests could also reflect something that's going on outside of your body" says study co-author Ziad Obermeyer of the University of California, Berkeley. "This is exactly the kind of pattern that doctors might miss. We're not looking for it, and lab tests are noisy."

To explore this question, Obermeyer and Devin Pope of the University of Chicago analyzed a large dataset of test results from 2009 to 2015, spanning several climate zones. In a sample of more than four million patients, they modeled more than two million test results as a function of [temperature](#). They measured how day-to-day temperature fluctuations affected results, over and above the patients' average values, and seasonal variation.

The results showed that temperature affected more than 90% of individual tests and 51 of 75 assays, including measures of kidney function, cellular blood components, and lipids such as cholesterol and triglycerides. "It's important to note that these changes were small: less than one percent differences in most tests under normal temperature conditions," Obermeyer says.

These small, day-to-day fluctuations did not likely reflect long-term physiological trends. For example, lipid panels checked on cooler days appeared to suggest a lower cardiovascular risk, leading to almost 10% fewer prescriptions for cholesterol-lowering drugs called statins to patients tested on the coolest days compared to the warmest days, even though these results probably did not reflect stable changes in cardiovascular risk.

Because the study wasn't an experiment, the researchers could not pinpoint the exact mechanisms underlying the fluctuations in lab results. Possible explanations include blood volume, specific assay performance, specimen transport, or changes in lab equipment. "Whatever their cause, temperature produces undesirable variability in at least some tests, which in turn leads to distortions in important medical decisions," Pope says.

One practical implication of the study is that laboratories could statistically adjust for [ambient temperature](#) on the test day when reporting [lab results](#). Doing so could reduce weather-related variability at a lower cost than new laboratory assay technology or investments in temperature control in transport vans. In practice, decisions on adjustment would need to be at the discretion of the [laboratory](#) staff and the treating physician, potentially on a case-by-case basis.

According to the authors, the study may also have broader clinical implications. "The textbook way of thinking about medical research is bench to bedside. First, we come up with a hypothesis, based on theory, then we [test](#) it with data," Obermeyer says. "As more and more [big data](#) comes online, like the massive dataset of lab tests we used, we can flip that process on its head: discover fascinating new patterns and then use bench science to get to the bottom of it. I think this bedside-to-bench model is just as important as its better-known cousin because it can open up totally new questions in human physiology."

**More information:** Ziad Obermeyer, Variation in Common Laboratory Test Results Due to Ambient Temperature, *Med* (2021). [DOI: 10.1016/j.medj.2021.11.003](https://doi.org/10.1016/j.medj.2021.11.003).  
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