Medical Xpress

Temperature scanners of limited value in detecting COVID-19

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Example of skin temperatures from an IR thermogram. This image was taken in the evening at an ambient temperature of 19°C. Body temperatures at the time were: Core 37.4oC; forehead 35oC; eye 35.6oC; nose 33.8oC; finger 33.3°C. Identifying fever-induced changes in deep body tissue might be improved by including hands in the thermogram and examining the difference finger and eye

temperatures. Credit: Jason Fisher

Making people stand in front of a scanner to have their body temperature read can result in a large number of false negatives, allowing people with COVID-19 to pass through airports and hospitals undetected.

Leading experts in physiology have suggested instead that taking temperature readings of a person's fingertip and eye would give a significantly better and more reliable reading and help identify those with fever.

The study, co-led by human physiologist and an expert in temperature regulation, Professor Mike Tipton, is published in *Experimental Physiology*.

Professor Tipton, of the University of Portsmouth, said: "If scanners are not giving an accurate reading, we run the risk of falsely excluding people from places they may want, or need, to go, and we also risk allowing people with the virus to spread the undetected infection they have."

The study found four key factors:

- Temperature alone isn't a good indicator of disease—not all who have the virus have a fever and many who do, develop one only after admission to hospital;
- Measuring skin temperature doesn't give an accurate estimation of deep body temperature (raised in a fever). A direct measure of deep body temperature is impractical;
- A high temperature, even one taken from deep body, does not

necessarily mean a person has COVID-19; and
- Taking two temperature measurements, one of the finger, the other of the eye, is likely to be a better and more reliable indicator of a fever-induced increase in deep body temperature.

Professor Tipton said: "Using a surface temperature scanner to obtain a single surface temperature, usually the forehead, is an unreliable method to detect the fever associated with COVID-19. Too many factors make the measurement of a skin temperature a poor surrogate for deep body temperature; skin temperature can change independently of deep body temperature for lots of reasons. Even if such a single measure did reflect deep body temperature reliably, other things, such as exercise can raise deep body temperature.

"The pandemic has had a devastating global effect on all aspects of our lives, and unfortunately, it's unlikely to be the last pandemic we face. It's critical we develop a method of gauging if an individual has a fever that's accurate and fast."

The most common symptom of 55,924 confirmed cases of COVID-19 reported in China up to February 22, 2020 was fever, followed by other symptoms, including dry cough, sputum production, shortness of breath, muscle or joint pain, sore throat, headache chills, nausea or vomiting, nasal congestion, and diarrhea.

How reliable? A woman has her temperature read via a temperature scan of her forehead. Credit: Mufid Majnun, Unsplash

However, the researchers say a significant proportion (at least 11 %) of those with COVID-19 do not have a fever, and that fewer than half those admitted to hospital with suspected COVID-19 had a fever. Although the majority of positive cases go on to develop a high temperature after being admitted to hospital, they were infectious before their temperature soared.

Professor Tipton said: "We think we can improve the identification of the presence of fever using the same kit but looking at the difference between eye and finger temperature—it's not perfect, but it is potentially better and more reliable."

The same scanners can easily be adapted to take these two measurements.

The new study argues that taking temperature readings of a person's fingertip and eye would give a significantly better and more reliable reading and help identify those with fever.

A change in deep body temperature is a critical factor in diagnosing disease with as little as a one degree increase indicating a potential disease.

The many methods of detecting deep body temperature, widely used in hospitals, are too expensive, invasive and time consuming to be widely used outside hospitals.

Professor Tipton said: "During the SARS epidemic, in 2003, there was a need for a fast, effective mass screening method and infrared thermography became and remains the cornerstone measurement, despite concerns over its reliability."

A 2005 study of 1,000 people comparing forehead temperature with three different infrared thermometers gave different temperatures, ranging from 31 degrees C to 35.6 degrees C. The infrared thermometers measurements alone varied by as much as 2 degrees C. In another study, more than 80 percent of the 500 people tested using infrared, gave a false negative result.

Such differences in skin temperature could be due to a range of reasons, including whether the individual has recently exercised, has an infection, sunburn or recently drunk alcohol, how close an individual stands to a scanner, how warm or cool the air is, how much fat a person has on their body and even their blood pressure.

More information: Igor B. Mekjavic et al. Degrees of freedom: Limitations of infrared thermography for screening for Covid-19 and other infections, *Experimental Physiology* (2020). DOI: 10.1113/EP089260