

Q&A: Cardiologist answers questions about health and heat

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The summer heat is here and with it questions about how we should

handle high temperatures and what we should do to feel well in the heat.

Cardiologist Petter Ljungman, associate professor at the Institute for Environmental Medicine and expert coordinator at the Center for Health Crises, answers questions about health and heat.

What happens in the body when it gets very hot?

The first thing that happens is that we start to sweat, and that is how you get an effect of evaporation on the skin that cools the body. At the same time blood vessels on the skin expands, which makes it possible for heat from the body to be transported away via the blood. But to do this the heart has to work harder. It must pump harder and more forcefully to maintain the blood pressure. All this is done to maintain a stable 37°C body temperature, otherwise the body's cell structures and processes are damaged.

If this continues and it keeps getting hotter and hotter, then we cannot manage to maintain the cool in the body in this way, and that is when we observe other consequences. Small damages, on a [microscopic level](#), arise on the organs in the body, such as the heart, lungs, kidneys, and brain. Intricate cell nutritional balances are disrupted and instead of protecting the body and maintaining normal processes a harmful chain of events begin, which initially have mild consequences but that can get serious. This is when we become a bit slow in our bodies, and our minds. It is often a mild lethargy, but you can get really confused and even get craps. In extreme cases this can end up with cardiovascular failure, meaning you die from heat stroke.

At what temperature do we begin to see heat having an effect on our health?

It varies greatly depending on multiple factors. High humidity makes it harder to lower the body temperature through evaporation. Building construction and town planning have an impact on both indoor and outdoor environments, through things like access to shade, breeze, absorption of heat in walls, and shading from direct sunlight.

Human behavior and culture are also important factors. If you are used to conditions where it gets hot regularly you adapt, and adapt your activities, both those that are planned and unplanned and have more knowledge and skills on how to reduce risks for you. Different people are also at different risk: the elderly, children and [pregnant women](#) have a harder time regulating their temperature, as well as people with [chronic illnesses](#) and accompanying medication. But other factors also play a part, [homeless people](#) can also have a harder time in heat, for example.

How should you act, to prevent risks and to handle heat and high temperatures?

Follow the Public Health Agency's advice. It is all about cooling down and creating a cool environment around you. You can, for example, take a cold shower or bath, or wrap a cold towel around you, if you are able. You should drink water and do so frequently. This is because we cannot store water in the body. We simply pee out the excess. We also need to replenish salts through what we eat and drink. You might need to add a little bit more salt to your food if you are sweating a lot, since that means you lose some salt.

Is there anything you should avoid doing when it is very hot?

Avoid [direct sunlight](#). Reduce physical activities and listen to your body. Avoid tea, coffee, and alcohol because that is diuretic, and alcohol also

affects the function of the blood vessels.

Many people in Sweden are on holiday the weeks when it is likely to be the hottest, but far from everyone is. What should you think about if you have to work, inside or outside, when it is very hot?

Schedule outdoor work for early morning or late afternoon/evening, when it is cooler, if possible, Bring a lot of fluids with you when you go outside and rehydrate regularly. Hat and light clothes that protects from sunlight are also good. Remember that it is good if there is a breeze, use air conditioning if it is available. Block out sunlight from the windows with curtains, blinds, and other things.

What should an employer/organization do to create the best possible work environment for their staff?

If possible, invest in air conditioning and fans. Investigate ways to block sunlight against windows and outer walls. Encourage your staff to rehydrate. A popsicle every once in a while also helps keep up the good spirit!

I work in healthcare, is there anything I should think about or that we as an industry should think about when it is very hot?

Follow the Public Health Agency's advice to staff in healthcare and other care professions. Keep in mind that several patient groups are extra vulnerable to heat, and that the lastingness of medicines can be affected. Be observant of your patients' condition and encourage them to follow the advice given to cool down and rehydrate. Remember that heat can

also affect your decision-making and irritability, so it is important as a caregiver that you also look after yourself!

How does our behavior in Sweden differ from behavior in countries where there are more used to heat and high temperatures?

We do not have the same level of experience of heat, and consequently not the same behavior nor do we have the same infrastructure in place. In Sweden we like to seek out the heat, whereas in warmer countries you tend to avoid the heat and stay indoors, or in shade and cool the hottest hours of the day. In Sweden our homes and towns are also constructed differently compared to warmer countries. There it is more common to have shutters on the windows, for example, that can be closed to keep sunlight and heat out during the day, and then opened in the evening to let cooler air in.

Even if we do not always have that particular option in Sweden, we can do our best with blinds and fans to keep our indoor environment as cool as possible. If it is really hot and maybe you have a basement that is cooler, you might use the option of sleeping or hanging out there, or if you have access to other houses with better cooling properties, like maybe a summer house, then you could consider relocating there if possible.

Some people think it is harder to sleep when it is hot, especially if it is also hot during the night. Why is that? Is there scientific evidence that we do not sleep as well when it is hot or is it more of a subjective experience? Is there any advice for sleeping better when it is hot?

When we sleep our body temperature is somewhat lowered, but that is a relatively complex reflex activity. Research in this field is not complete, but there are reports suggesting that the quality of sleep is affected negatively in a hot indoor environment. One advice that suggest taking a hot bath or soak your hands and feet in hot water before going to bed and that should potentially make you fall asleep quicker because it actively forces the body to reduce your body temperature. But you will likely have to experiment a bit yourself and see what works for you when it comes to relaxing and falling asleep.

What warning signs from the body should you be mindful of when it is very hot and how should you act if you begin to feel unwell?

There are three kinds of directly heat related conditions described:

Heat stroke is the most serious heat related health condition. It is life threatening and you should call 112 if you suspect it and move the person to a cooler environment and try to lower the body temperature with the help of cool clothes, a cold bath or water. Heat stroke occurs when the body temperature is over 40 degrees and the person often has flushed, red and dry skin, and a rapid and forceful pulse. He or she might also be confused or sluggish, dizzy, irritable, have a headache, vomit, be nauseous or become unconscious and have seizures.

Heat exhaustion: Prior to developing heat stroke you might get heat exhaustion. This is when you sweat a lot and have cold, clammy skin and a rapid but weak pulse. Less pronounced symptoms are dizziness, especially when standing up, sluggishness, headache, and muscle cramps. In these cases, you should seek a cooler place, rehydrate, loosen tight clothing, dab the body (preferably forehead, groin, and wrist) with cold wet clothes or other fabric. If the condition gets worse or does not

improve in an hour you should contact emergency health care.

Heat cramps: Presents with copious sweating and muscle cramp when doing physical activity. Stop the physical activity, move to a cool environment, drink fluids, maybe containing salt and electrolytes. Do not resume the activity until the cramps have gone away.

Which groups of people are most vulnerable when it becomes extremely hot?

The elderly and weak, in particular. But also people with preexisting heart, lung and kidney diseases. Pregnant women and children are also vulnerable.

Children are affected because they are smaller, basically. Their bodies are smaller, the ratio between surface and body mass means that it is harder to cool the body.

The elderly have poorer temperature regulation with less sensitive reflexes. For people with chronic illness, then it might be that the illness itself causes an increased vulnerability, or it could be an effect of the medication they need for the illness.

Pregnant women's metabolism and circulation change, which makes them vulnerable. They also have two people that are generating heat inside one body!

If I belong to one of the vulnerable groups, or have loved one that does, what should I do and what should I think about to care for myself or my loved one in the best way?

Follow the advice from the Public Health Agency. Stay in touch with loved ones and help each other to create good environments and conditions. It means a lot to be a bit more vigilant and to get the occasional reminder, to help keep focus, feel motivated and support each other for good health.

Your research concerns extreme weather, including heat. What does your research look at and have you got any examples of new research in the field?

Research in the field has become more active, because we clearly see how climate change is driving and creating more heat periods that occur more frequently, and earlier in spring and summer. The questions we are now asking is how should we evaluate warning systems and make them the most effective, as well as the action plans they trigger? At what threshold should a warning system be triggered to be most effective? What form of communication is most effective?

In an ongoing project in India, where [heat waves](#) follow on each other every season and now occur already in March and April, we are looking at how different definitions of heat wave relate to mortality to find a balance that is both practically useful and captures the complexity of the problem.

The heat also contributes to other risks, such as forest fires, which pose a direct threat in the form of fire damage, but also an indirect risk because of air pollution. The heat also leads to poorer harvests, malnutrition, increased risk of infectious disease and makes flooding more likely.

When people die of heat, what is it they actually die from?

Mainly they die because of a worsening in our common diseases, mainly heart, kidney, and lung disease. A small portion of the deaths are due to [heat stroke](#). During the heat wave in 2018 we had an excess death of about 700 people in Sweden during the summer months, that coincide with the heat wave. During the summer of 2022 some 15,000 people across Europe died from the extreme heat, including 4,600 in Spain, 4,500 in Germany and 2,800 in the U.K.

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