Medical Xpress

Heat waves may increase the likelihood of seizures in people with epilepsy

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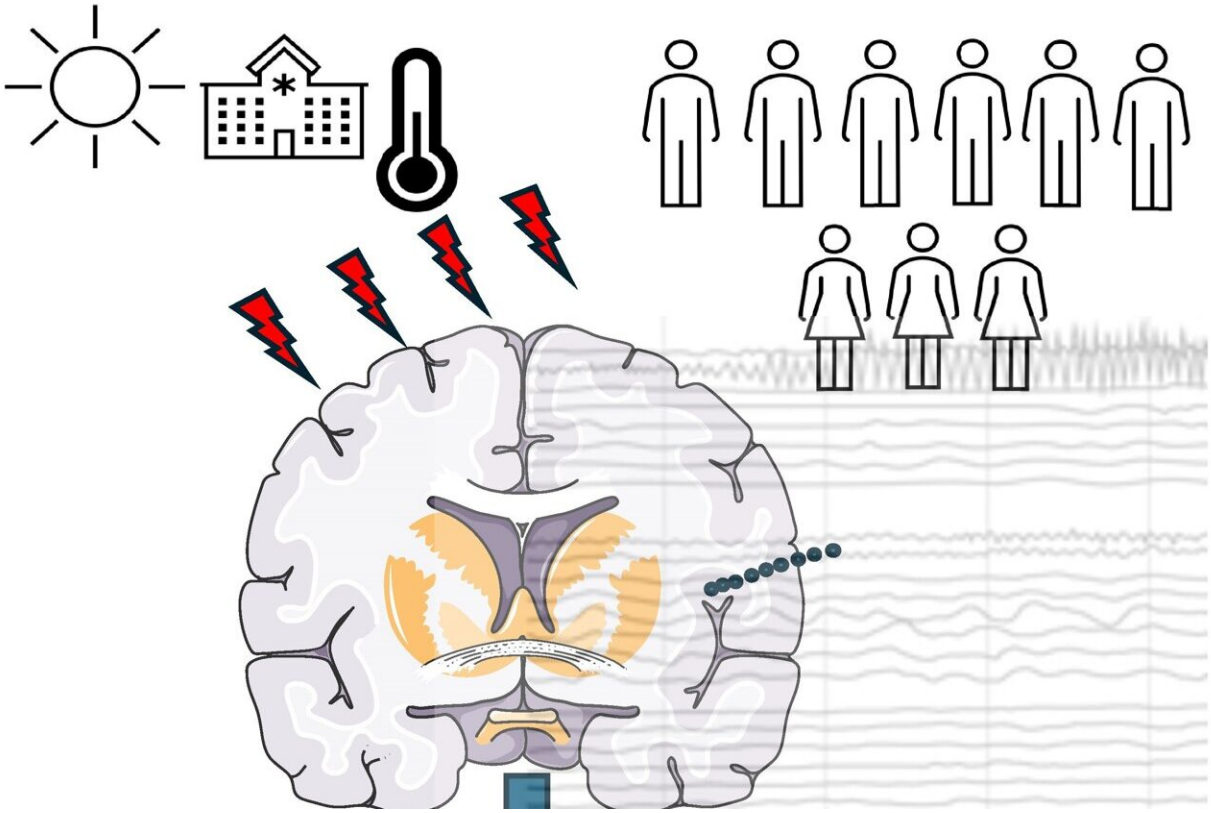

Credit: *Brain Communications* (2024). DOI: 10.1093/braincomms/fcae269

Heat waves can worsen abnormal excitability of the brain in people with epilepsy, finds a new small-scale patient study by clinical scientists at UCL.

The research, published in *Brain Communications*, used intracranial electroencephalography (icEEG) tests.

Small electrodes were inserted into the substance of the brain to measure electrical impulses to track the brain activity of nine patients being evaluated for surgical treatment of medication-resistant epilepsy at the National Hospital for Neurology and Neurosurgery in the summer months (May–August) of 2015–2022.

Genomic testing showed that none of the participants had known genetic epilepsies that are already associated with worsening of seizures during heat waves.

In London, a heat wave is defined as three or more consecutive days with daily maximum temperatures of more than 28°C.

The nine patients involved in the study were, by chance, having icEEG recordings taken during spontaneous heat waves in London, allowing the researchers to directly examine their brain activity during periods of unusually hot weather.

The researchers then compared this data to icEEG recordings taken from the patients during non–heat wave periods, while ensuring that all other conditions (apart from temperature) remained the same.

For each participant, the team logged any abnormal electrical activity across four 10-minute segments within and outside of heat waves. They also tracked all seizures.

They found that, overall, more seizures were recorded by the icEEG during heat waves compared with the non-heat wave period. Meanwhile, three patients also had more abnormal electrical brain activity aside from seizures during heat waves.

Senior author, Professor Sanjay Sisodiya (UCL Queen Square Institute of Neurology), said, "Our research shows that for some people with epilepsy—in particular those with the most severe epilepsies—higher ambient temperatures increase the likelihood of having seizures.

"This is an important finding, providing some of the first evidence that for some people who already have epilepsy, higher temperatures seen during heat waves can make their condition worse.

"Such information is important for the care of individual people with epilepsy, and also for broader efforts to ensure people with epilepsy can be kept safe as the climate changes."

The current study sample size is relatively small as icEEG is not commonly undertaken and a heat wave had to have happened, by chance, during the recording.

However, the team now hope to have a bigger prospective study, and data are currently being collected.

Professor Sisodiya said, "Despite the study's limited sample size, our findings remain valuable in the context of climate change. As global temperatures rise and extreme weather events become more frequent, understanding the effects of heat waves on brain activity is crucial."

Professor Sisodiya recently led to a review of 332 papers published across the world, that explored the scale of potential effects of climate change on neurological diseases.

The researchers found that the effect of climate change on weather patterns and adverse weather events is likely to negatively affect the health of people with brain conditions, including stroke, migraine, Alzheimer's, meningitis, epilepsy and multiple sclerosis. The new

research adds to this analysis.

More information: Olivia C McNicholas et al, The influence of temperature and genomic variation on intracranial EEG measures in people with epilepsy, *Brain Communications* (2024). DOI: 10.1093/braincomms/fcae269

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