# Researchers identify brain circuits involved in stress-induced fevers

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When we feel mentally stressed, we often also feel physiological changes, including a faster heart rate and an increase in body temperature. This increase in body temperature is known as psychological stress-induced hyperthermia, which is a basic stress response broadly observed in mammals. The response is helpful for warming up the muscles during "fight or flight" situations, such as when wild animals face their enemies; however, stress for people in today's

society can last a long time and cause a chronic increase in body temperature, a condition called psychogenic fever, which brings on intense fatigue.

Now researchers publishing online on June 26 in the Cell Press journal *Cell Metabolism* have identified a key neural circuit connection in the brain that's responsible for the development of psychological stress-induced hyperthermia and likely also plays a role in chronic psychogenic fever.

The researchers, led by Dr. Kazuhiro Nakamura of Kyoto University, in Japan, used a social defeat stress test in rats, which is similar to human social stress, to induce psychological stress-induced hyperthermia. Inhibiting neurons in either of two brain regions—the dorsomedial hypothalamus and the rostral medullary raphe—eliminated stress-induced heat production in brown fat tissue as well as stress-induced increases in the rats' body temperature. (While white fat normally stores calories, brown fat burns them and generates heat in the process.) Alternatively, stimulating the neurons that wire between these two brain regions caused brown fat tissue to produce heat and increased blood pressure and heart rate, similar to the effects of stress.

"Many people with psychogenic fever, especially many teenagers, suffer from chronic increases in their body temperature that last more than a month," says Dr. Nakamura. "Our study revealed a fundamental central circuit mechanism underlying psychological stress-induced hyperthermia , and this mechanism may be important in understanding how psychogenic fever develops. It may also be important for designing clinical approaches to treat it."

**More information:** *Cell Metabolism*, Kataoka et al.: "Psychological Stress Activates a Dorsomedial Hypothalamus-Medullary Raphe Neural Circuit to Drive Brown Adipose Tissue Thermogenesis and

Hyperthermia." www.cell.com/cell-metabolism/a … 1550-4131(14)00226-5

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