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INSIDE JEB

Unexpected eye fat pad likely helps ground squirrels wake up

Just before they turn in to hibernate away the winter, thirteen-lined ground squirrels become little balls of fat. Piling on the calories to get them through the long fast, the rodents also accumulate a specialised form of fat, known as brown adipose tissue, which produces heat like a mini furnace to increase their body temperatures rapidly by 32°C when they dip in and out of their seasonal 'slumber'. So, when Amanda MacCannell from the University of Western Ontario, Canada, and colleagues began monitoring how the mammals put on the pounds using MRI scans, they were surprised to notice a pad of fat around the optic nerve – just behind the eyeball – that tripled in size in the months leading up to hibernation. Realising that the pad resembled other regions of brown fat distributed around the ground squirrels' bodies, the team began searching for evidence of the heat-generating protein (uncoupling protein 1), which is the hallmark of brown adipose tissue, to back up the hunch. However, after failing to find the protein, it was evident that the eye fat pad could not be a clandestine heater. Yet, the fatty deposit was somehow contributing to the rapid increase in the ground squirrels' body temperature, as thermal images of the arousing animals showed the region near their eyes glowing hot almost an hour into the process.

Wondering whether the pad could be a heat exchanger packed with blood vessels to retain heat that would otherwise be lost through the eyes, MacCannell scrutinised the pad under a microscope and discovered that it is threaded with the minute blood vessels that would be essential for preventing heat loss. 'All of the evidence pointed towards a vascular rete [network]', says MacCannell, who is keen to use CT scans to reveal whether the 3D arrangement of the blood vessels in the fatty pad could allow warmth that would otherwise seep from the body to be retained by blood heading to the brains of the reawakening rodents.

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