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Restricting calories lowers body temperature, may predict longer lifespan

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(Medical Xpress) -- Nutrition and longevity researchers have found more evidence that eating less may help people live longer.

The research team at Washington University School of Medicine in St. Louis reports in the journal *Aging* that individuals who significantly reduce their calorie intake have lower core body temperatures compared to those who eat more.

The new finding matches research in animals. Mice and rats consuming fewer calories also have lower core body temperatures, and those animals live significantly longer than littermates eating a standard diet.

The investigators compared core body temperatures of 24 people in their mid 50s who had practiced calorie restriction for at least six years to 24 others of the same age who ate a standard Western diet with higher calorie and fat intake. The researchers also measured core body temperatures in 24 endurance runners of the same age to determine if being lean — like both the calorie restriction group and the runners — was linked to lower body temperature or whether calorie restriction itself was necessary.

“The people doing calorie restriction had a lower average core body temperature by about 0.2 degrees Celsius, which sounds like a modest reduction but is statistically significant and similar to the reduction we have observed in long-lived, calorie-restricted mice,” says principal investigator Luigi Fontana, MD, PhD. “What is interesting about that is

endurance athletes, who are the same age and are equally lean, don't have similar reductions in body temperature."

Organisms from yeast to rodents to humans all benefit from cutting calories. In simple organisms, restricting calories can double or even triple lifespan. It's not yet clear just how much longer calorie restriction might help humans live, but those who practice the strict diet hope to survive past 100.

Those on calorie restriction cut their daily caloric intake by 25 percent or more, but they also carefully track vitamins and nutrients in the diet in order to avoid malnutrition. In this study, all of those in the group practicing calorie restriction were members of the CR Society, and they refer to themselves as CRONies (Calorie Restriction with Optimal Nutrition).

A person's core body temperature is the temperature at which all of the functions in the body can operate with maximum efficiency. The temperature of the human body is not uniform throughout, and internal readings tend to be higher than those taken closer to the skin. Although the ideal core body temperature is considered to be 98.6 degrees Fahrenheit or 37.7 degrees Celsius, body temperatures vary from about 96 degrees to almost 100 degrees.

For this study, investigators measured core body temperature using telemetric capsules that participants swallowed, which then recorded and transmitted internal body temperatures every minute.

Fontana, a research associate professor of medicine at Washington University and a senior investigator at the Istituto Superiore di Sanità in Rome, Italy, says he does not know whether severely limiting calories is lowering body temperatures or whether something else is causing core temperature to drop, but he says the reduced temperature is a key to

increased longevity in animals.

“What we don’t know is whether there is a cause/effect relationship or whether this is just an association,” he says. “But in animal studies, it’s been consistently true that those with lower core body temperatures live longer.”

The researchers also note that in an unrelated study called the Baltimore Longitudinal Study of Aging, scientists found that men who had lower core body temperatures, probably for genetic reasons, lived significantly longer than men with higher body temperatures. So it appears body temperature may predict longevity in humans, too, Fontana says.

What is not yet understood is how much longer people with lower body temperatures might live. Rodents on a calorie-restricted diet have been known to live up to 50 percent longer, but those increases can be measured in months.

For now, animal models suggest that simply lowering body temperature isn’t enough to increase lifespan. In mice and rats that regularly swam in cold water, core body temperature dropped due to exposure to the cold water. But those animals didn’t live any longer than normal rodents. Fontana says it appears that how lower temperatures are achieved is important.

“I don’t think it ever will be possible to be overweight and smoking and drinking and then take a pill, or several pills, to lower body temperature and lengthen lifespan,” he says. “What may be possible, however, is to do mild calorie restriction, to eat a very good diet, get mild exercise and then take a drug of some kind that could provide benefits similar to those seen in severe calorie restriction.”

More information: Soare A, Cangemi R, Omedei D, Holloszy JO,

Fontana L. Long-term calorie restriction, but not endurance exercise, lowers core body temperature in humans. *Aging*, vol. 3 (3) March 2011. www.impactaging.com

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