High food availability slows down cell aging

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High food availability during summer time slows down cell aging in dormice and not hibernation. Credit: Vetmeduni Vienna

Hibernation has long been considered the secret behind the relatively long lifespan of the edible dormouse. However, a team of researchers from Vetmeduni Vienna has now shown for the first time that high food availability during the active season in summer contributes to a long life.

Increased food availability during this time allows the animals to slow their cellular aging. The study was published in the *Journal of Experimental Biology*.

"Telomeres get shorter with every cell division and are therefore considered a biological marker of ageing", explains Franz Hoelzl from Vetmeduni Vienna's Research Institute of Wildlife Ecology. Telomeres form protective caps at the ends of the chromosomes to prevent genomic degradation. When the telomeres become too short, cell division is no longer possible and the cell looses the potential to divide and dies. It had previously been assumed that the slowing down of body functions during hibernation was responsible for decreasing the rate of telomere degradation. The edible dormouse's long torpor-phases would thus contribute to its high life expectancy.

Hibernation does not slow down cellular aging in edible dormice

But Hoelzl and his team demonstrate that hibernation is not the cause for the animals' slowed down aging processes. Especially the so called arousals, repeated rewarming phases during which hibernaton repeatedly rewarm, led to tremendous shortening of telomeres. The researchers show that the more frequently the animals interrupted their torpor phases, the more the telomeric caps got shortened. After showing that hibernation is not responsible for the decreased rate of ageing in dormice, in terms of telomere shortening, the researchers looked for alternative explanations.

"Unexpectedly, the true 'fountain of youth' is high food availability during the active season",Hoelzl states. To show this, the researchers came up with a very simple yet clever experiment. They chose a year with a low abundance of beechnuts, the animals' main natural food

source. Then the animals were split into two groups. The diet of the first group was supplemented by sunflower seeds, while the other group was restricted to the naturally available food sources. DNA samples were taken from all animals before and after the experiment. The team then used molecular methods to determine telomere length.

A full belly rejuvenates the cells

The DNA analysis revealed that telomere length at the end of the experiment was directly correlated with food availability. Only the group that received surplus food had longer telomere lengths at the end of the study. The animals restricted to naturally occurring food sources, on the other hand, were barely able to compensate for telomere degradation.

The capability of dormice to elongate telomeres in normal body cells is very unusual. In other organisms, including humans, telomere elongation occurs only in germ cells and tumour cells. Thus, edible dormice have somehow managed to keep their cells physiologically young without developing cancer.

More information: Franz Hoelzl et al. Telomere dynamics in free-living edible dormice (): the impact of hibernation and food supply, *The Journal of Experimental Biology* (2016). DOI: 10.1242/jeb.140871

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