Eating less enables lemurs to live longer

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The animal on the left, which weighs around 100 g, has been fed a 'normal' diet throughout its life (CTL). It presents characteristics that are frequently observed

among elderly mouse lemurs: cataracts and whitening of the fur. The animal on the right, which weighs around 70 g, has been fed 30 percent fewer calories (CR) compared to the control group since early adult life. It has the morphological characteristics of a younger animal. Credit: CNRS/MNHN

Chronic caloric restriction consists of eating a reduced but balanced diet from early adult life onward. Previous research, into macaques in particular (which have an average lifespan of forty years), had already demonstrated its beneficial effect on the incidence of age-related pathologies. However, its positive effect on the lifespan of primates remained controversial. To study this question, the researchers focused on the grey mouse lemur, a small primate whose lifespan (around 12 years) makes it a very good model for the study of aging. Moreover, this small lemurid has many physiological similarities with humans.

The scientists exposed a group of mouse lemurs to moderate chronic caloric restriction (30 percent fewer calories than their peers consuming a normal diet) from the outset of early adulthood (Restrikal cohort, see visuals below). They then considered their survival data as well as possible age-related alterations. The first result, after the experiment had been running for ten years, was that in comparison to the animals in the control group, the lifespan of those subject to caloric restriction increased by almost 50 percent. More specifically, their median survival is 9.6 years (compared to 6.4 years for the mouse lemurs in the control group). And for the first time among primates, the scientists observed that the maximum lifespan had increased—almost a third of the calorie-restricted animals were still alive when the last animal in the control group died at the aged of 11.3 years.

This beneficial effect was accompanied by the preservation of motor capacities, without any alteration to cognitive performance, and a

reduction in the incidence of pathologies usually associated with aging, such as cancer or diabetes. The calorie-restricted mouse lemurs present the morphological characteristics of a younger animal. Furthermore, brain imaging data for these very elderly animals shows a slight loss of grey matter (neuronal cell bodies), an effect that the researchers have not yet explained, as well as significantly slowed atrophy of white matter (the neuronal fibers connecting different areas of the brain).

The results indicate that chronic caloric restriction is currently the most effective way to extend maximum lifespan and delay the aging process in a non-human primate. The next step for the scientists is to associate chronic caloric restriction with another study parameter, such as physical exercise, in an attempt to further extend the upper limits of lifespan.

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