

Cutting calories slightly can reduce aging damage

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A lifelong habit of trimming just a few calories from the daily diet can do more than slim the waistline — a new study shows it may help lessen the effects of aging.

Scientists from the University of Florida's Institute on Aging have found that eating a little less food and exercising a little more over a lifespan can reduce or even reverse aging-related cell and organ damage in rats.

The discovery, described this month in the journal *Antioxidants and Redox Signaling*, builds on recent research in animals and humans that has shown a more drastic 20 percent to 40 percent cut in calories slows aging damage. The UF findings indicate even small reductions in calories could have big effects on health and shed light on the molecular process responsible for the phenomenon, which until now has been poorly understood.

“This finding suggests that even slight moderation in intake of calories and a moderate exercise program is beneficial to a key organ such as the liver, which shows significant signs of dysfunction in the aging process,” said Christiaan Leeuwenburgh, an associate professor of aging and geriatric research at the UF College of Medicine and the paper's senior author.

UF scientists found that feeding rats just 8 percent fewer calories a day and moderately increasing the animals' activity extended their average lifespan and significantly overturned the negative effects of cellular

aging on liver function and overall health.

An 8 percent reduction is the equivalent of a few hundred calories in an average human diet and moderate exercise is equivalent to taking a short walk.

To reveal the workings of the body's chemical climate when aging-related damage happens, UF researchers tracked levels of biomarkers — chemicals and molecules present in the liver — in groups of rats. The liver, a crucial organ for maintaining good health during aging, cleans the blood and helps regulate the body's immune system. The researchers also plan to assess the same biomarkers in a study of rats' hearts, muscle and brains.

The research team was surprised to find one of the biomarkers, RNA, which is important for coding DNA and for protein synthesis, is more quickly damaged by aging than the more frequently studied DNA. RNA damage, therefore, could be an excellent early signal to indicate the onset of aging, researchers say.

“Because it is more sensitive to oxidative stress, RNA can be useful as an early marker of oxidative damage and even aging,” said Arnold Y. Seo, a doctoral student in UF's Institute on Aging.

Seo authored the report along with Tim Hofer, an Institute on Aging research associate.

“To avoid disease, we can increase our defense and look for aging biomarkers and then test interventions,” Hofer said. “It is better to protect what is there to improve the quality of life than to have to resort to invasive procedures.”

In the study, which followed the rats over their lifespan, one group of

animals ate as much food as they wanted and did not exercise, another group of animals exercised lightly and were fed slightly less than they would have eaten if allowed to have their fill. Liver samples from these groups were compared with samples taken from young rats.

The old sedentary rats that ate until they were full had increased levels of harmful oxidizing and inflammatory molecules in the liver that were associated with cell damage caused by aging. Meanwhile, aging rats that exercised and consumed a calorie-restricted diet, had the reverse outcome — they showed a decrease in these molecules in the liver.

Leeuwenburgh said the study results support the theory that cell death and aging-related organ damage are caused by unstable molecules known as free radicals and by cellular oxidation and inflammation.

“In a calorie-restricted environment, you reduce the inflammatory response and prevent cell death,” Leeuwenburgh said.

John O. Holloszy, a professor of medicine in the division of geriatrics and nutritional sciences at Washington University School of Medicine in St. Louis, said the study is of major importance because it shows a mild degree of caloric restriction — just enough to prevent weight gain with advancing age — can have beneficial effects against aging. From a scientific perspective, he added, it is important to learn that RNA is a very good marker of aging damage.

“I’d never really thought about RNA before,” Holloszy said. “Research has always looked at DNA. Because RNA is the template for the information on the genes on the DNA, RNA damage is a major problem because it results in mutations in the transcription of proteins.”

Source: University of Florida

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