

Eat less and live to a ripe old age?

BY GENEVIÈVE GRIMM-GOBAT

Experiments with animals have shown that eating very little lengthens life span. Studies are now producing promising results in humans as well.

Since the dawn of time, humans have searched for an elixir that can slow the inexorable aging process. The list of potions is long—from Bulgarian yogurt to royal jelly and fermented papaya to chimpanzee testicles, not to mention such chemicals as Omega 3, resveratrol, DHEA, melatonin, procyanidine and, rapamycin. But life, alas, remains frustratingly short.

Several studies are taking a completely different tack, even if they get little media attention because there is no money to be made from their results. Their angle: eating less can contribute to lengthening life spans, as experiments on calorie restriction in more than 50 species (including yeast, invertebrates, fish, rodents and monkeys) have shown. The underlying hypothesis is that caloric restriction improves mitochondrial metabolism. The mitochondria, the energy-producing factories in the cell, in turn reduce DNA fragmentation by diminishing oxidative stress.

Any extrapolation of results obtained from animals to humans is risky. Even so, residents of the Japanese island of Okinawa are an interesting case. They have the world's longest average lifespan and the highest proportion of centenarians. They consume

40% fewer calories than Americans and 17% fewer calories than other Japanese, following a practice known as “Hara Hachi Bu” (translated approximately as “eat until 80% full”). Researchers have turned to the caloric restriction hypothesis to explain their exceptional longevity. But they still need to verify this with a human sample from another culture.

SLOWING DOWN METABOLISM

Roy Walford, an American physician, is considered the pioneering figure in studies linking longevity and caloric intake. He observed that the life spans of laboratory mice could double with a caloric reduction of 50%. He assembled his findings in a best-seller published in 2000 entitled “Beyond the 120-Year Diet.” Over a 30-year period, he applied his precepts to his own life, consuming a meager 1,600 calories a day. It didn't help him reach the ripe old age of 100, though; he died in 2004 at the age of 79.

Eric Ravussin, a biologist trained at the University of Lausanne, is conducting research on this topic at the Pennington Biomedical Research Center in Baton Rouge, Louisiana. In 2002 he won a \$12 million grant from the U.S. government to study whether caloric restriction would also permit

humans to live longer. In 2006, he published his preliminary results, based on physiological measurements taken from his subjects – participants who were sufficiently motivated that they agreed to under-nourish themselves. After six months of observation, he noted that subjects receiving a low daily ration of calories had decreased insulin levels, and their metabolisms had slowed down. These changes are extremely promising in the eyes of the authors, who associate these factors with increased life span. Their results were presented at a conference held at the Mayo Clinic*. “For the first time, we have proof that eating less can prolong life,” says Ravussin.

On this side of the Atlantic, EPFL professor Johan Auwerx argues that many factors come into play in longevity. Seven hundred genes are involved, in addition to lifestyle differences and a nutritional intake that is lower than the average: “It has been shown that to live longer, we must actually meet only 80% of our nutritional needs.” ■

* <http://ctsa.mayo.edu/resources/presentations/metabolomics-workshop-2010/ravussin.html>