National Institute on Aging:
Restricting Caloric Intake May Improve the Body's Metabolic Efficiency

NIH-supported investigators demonstrated that restricting caloric intake may improve the body's metabolic efficiency, an effect that could contribute to slowing of adverse changes that often accompany aging.

Lead Agency:
National Institute on Aging
National Institutes of Health (NIH)

Agency Mission:

Support and conduct genetic, biological, clinical, behavioral, social, and economic research related to the aging process, diseases and conditions associated with aging, and other special problems and needs of older Americans.

Foster the development of research and clinician scientists in aging.

Communicate information about aging and advances in research on aging to the scientific community, health care providers, and the public.

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General Description:

Restricting Caloric Intake May Improve the Body's Metabolic Efficiency
Calorie restriction (CR) is the most robust, nongenetic intervention that increases lifespan and reduces the rate of aging in a variety of species. Mechanisms responsible for the antiaging effects of CR remain uncertain but effects on efficiency of energy metabolism and mitochondria (subunits within cells that are the primary source of cellular energy) remains a major focus of research. To understand CR's effects in energy metabolism and mitochondrial function in humans, NIH-supported researchers studied its effects over six months in overweight people. They found that CR lowered body temperature and lowered metabolic rate by more than would be expected based on weight loss alone. They also found evidence of new mitochondria. Combined, these results suggest that CR may cause the body to shift to more "efficient" mitochondrial function, resulting in less energy expenditure and cooler body temperature. The latter is of particular interest because in one study, cooler body temperature was associated with longer human lifespan.

Excellence: What makes this project exceptional?

Numerous studies in laboratory animals have shown that chronic caloric restriction extends lifespan by as much as 40 percent and delays age-related pathologies correspondingly. However, little has been known about the effects of CR in humans. This study is a first step in understanding whether CR's effects in people resemble those found in laboratory animals.

Significance: How is this research relevant to older persons, populations and/or an aging society?

By understanding the effects of caloric restriction in people, we may gain insights into interventions to slow the development of age-related diseases.

Effectiveness: What is the impact and/or application of this research to older persons?

There are no immediate clinical or public health applications. We need to learn more about the effects of caloric restriction in humans before evaluating its potential for improving health, aging, or lifespan.

Innovativeness: Why is this research exciting or newsworthy?

Caloric intake is a topic of broad interest as concerns increase regarding obesity and weight gain. This study sheds new light on the effects of decreased caloric intake on metabolic processes.