To stay young, eat less!

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A reduction in calorie intake reduces the accumulation of inflammatory cells in organs and attenuates the expression of certain genes associated with aging, two key factors involved in the decline of physiological functions with age.

Aging is associated with a gradual decrease in the function of several organs, at the same time increasing the risk of developing several chronic diseases (cardiovascular, type 2 diabetes, different types of cancer, neurodegenerative diseases such as Alzheimer's).

While aging is inevitable, the appearance of these diseases is not necessarily so: we have known for several years that lifestyle factors such as the absence of smoking, regular physical activity, a diet mainly made up of plants and body weight control can greatly decrease the risk of developing these diseases and improve healthy life expectancy.

CALORIE RESTRICTION

Calorie restriction (reduced energy intake, but not lacking in essential vitamins and minerals) is another factor of great interest.

A very large number of studies have indeed clearly shown that a decrease in caloric intake increases the longevity of several simple organisms (yeasts, fruit flies, worms) and of different species of mammals (rodents, primates by 30 to 50%) [1]. For example, in rhesus monkeys (which have a 93% identical genome to ours, calorie restriction is associated with a decrease in the incidence of type 2 diabetes, cardiovascular disease, cancer, neurodegeneration, as well as to an increase in longevity [2].

LOWERING INFLAMMATION

A recent study suggests that these improvements may be a consequence of the direct effects of calorie restriction on the expression of several genes involved in aging [3].

For about a year, the researchers fed rodents a normal diet or a low-calorie diet [calories reduced by 30%] and subsequently isolated from the two groups of animals as many as 168,703 cells from 40 different organs. Using a technique that sequenced the genes present in each of the cells, they noticed that many of the changes that occurred during the aging of normally fed animals did not occur in those subjected to the calorie restriction.

This phenomenon is particularly pronounced for genes involved in inflammation: for example, while the number of inflammatory cells [neutrophils in particular] present in organs increases sharply in animals which were fed normally, this increase is not at all observed in those with reduced calorie intake.

In other words, the cells of older animals that eat less look like those of younger ones! Since chronic inflammation is a real spark plug for all chronic diseases, this suggests that calorie reduction may be a simple way to reduce this inflammation and lower the risk of these diseases.

TO EAT LESS

Let's face it, the ubiquity of food in our environment makes eating less a challenge for most people.

Challenge made even more difficult by the fact that more than half of the calories consumed by Canadians come from ultra-processed foods: the very high caloric density of these foods bypasses our satiety systems and causes overconsumption of calories which results in accumulation of fat.

Reducing the consumption of these foods in favor of natural foods, not industrially processed, therefore represents an interesting first step for anyone looking to reduce his or her calorie intake.

Another approach, which is increasingly being studied, is to alternate periods when food intake is normal with periods of more or less prolonged fasting, which is called intermittent fasting.

A common form of this type of fasting is time-restricted feeding, where calorie intake is limited to a time of day, for example by skipping breakfast or having an early supper, followed by a fast of more than 12 hours which includes the period of sleep.

Several preclinical studies have shown that this type of diet decreases inflammation, improves insulin sensitivity and prevents or delays the progression of several chronic diseases [4].

(1) Fontana L et L Partridge. Promoting health and longevity through diet: from model organisms to humans. Cell 2015; 161 : 106-118.

(2) Mattison JA et coll. Caloric restriction improves health and survival of rhesus monkeys. Nature Comm. 2017; 8 : 14 063.

(3) Ma S et coll. Caloric restriction reprograms the single-cell transcriptional landscape of Rattus norvegicus aging. Cell 2020; 180 : 984-1001.

(4) Mattson MP et coll. Impact of intermittent fasting on health and disease processes. Ageing Res. Rev. 2017; 39 : 46-58.

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