Can Eating Less Make You Live Longer?

Calorie restriction [CR], the term for cutting back on the amount of food given to laboratory animals, is the most robust lifespan extending intervention known, and is the archetype for anti-aging treatments. Restricting food to animals anywhere from 10% to 50% causes the animals to live much longer than regularly fed animals, as much as 50% longer. The degree to which they live longer directly correlates to the amount of food restricted. Since it was discovered in the early 20th century, scientists have asked the question, can less food make people live longer? Can it extend human lifespan to the same degree as in animals, or less, or not at all?

Pro: CR will extend human lifespan

Carrying out a controlled experiment to see how CR affects human lifespan is next to impossible, since humans live such a long time, can't be kept under controlled conditions like cages, and not many people are willing to restrict their food consumption to the degree necessary.

However, if CR in humans improves known biomarkers of disease risk, such as fasting glucose and insulin, or blood pressure, then we could reasonably expect that it will extend human lifespan.

One group of people has decided not to wait to see whether CR has an effect on humans and are practicing CR; these are the members of the Calorie Restriction Society. A few years back, some scientists decided to study them to see whether they had the makings of a long life. There were only 18 of them, 14 men and 4 women. Their average age was 50. Following is their data before and after CR:

	Before CR	1.0±0.3 y) CR	6.5±4.8 y CR
Body mass index (kg/m^2)	23.7 ± 2.6 (33)	20.3 ± 2.0 (28)	19.6 ± 1.6 (33)
Total cholesterol (mg/dl)	211 ± 36 (24)	165 ± 33 (16)	159 ± 36 (24)
LDL-cholesterol (mg/dl)	124 ± 37 (20)	94 ± 21 (14)	89 ± 30 (20)
HDL-cholesterol (mg/dl)	47 ± 8 (20)	59 ± 13 (14)	64 ± 21 (20)
Total chol.:HDL-chol. ratio	4.5 ± 1.1 (20)	2.9 ± 0.6 (14)	2.6 ± 0.5 (20)
Triglycerides (mg/dl)	134 ± 81 (24)	68 ± 22 (16)	49 ± 14 (24)
Systolic blood pressure (mmHg)	131 ± 15 (20)	112 ± 12 (14)	101 ± 9 (20)
Diastolic blood pressure (mmHg)	82 ± 9 (20)	71 ± 7 (14)	61 ± 7 (20)

In a separate comparison, the CR group's fasting insulin averaged 1.5, compared to a Western diet group which averaged 7.4.

Note that the average BMI was under 20, i.e. thin. All lipid markers as well as blood pressure improved after CR. One wonders how much their diet improved after CR, besides fewer calories, since if the composition of their diets changed, that could affect results too.

The scientists noted that although it's impossible to know how long these people would live, they appear to have very low risk of diabetes and atherosclerosis, and that their biological adaptations were similar to those seen in long-lived, calorically restricted lab animals.

Their biomarkers for heart disease risk fall within the range of the lowest 10% of risk.

Based on this, Mikhail Blagosklonny, the noted scientist in the study of aging, wrote:

> There is no reason to think that humans would respond differently to CR [calorie restriction] compared with other mammals. If so, CR must extend life span on average 30% in humans. Given an average life span of 80 years, that would be 24 years. However, current human life span of 80 years is already extended by medical interventions. Patients with atherosclerosis, hypertension, diabetes and other age-related diseases survive due to medical intervention… In contrast, if an aging mouse gets heart attack and cancer, it simply dies. Unlike humans, unrestricted (ad libitum fed) mice die from untreated age-related diseases. If age-related diseases were not treated in humans too, then CR would perhaps extend life span by 30% in humans. But coronary artery bypasses, radiation, beta-blockers and other treatments for age-related diseases can partially substitute for the anti-aging effect of CR. This complicates the calculation.

Would CR extend human life by 30%? Even if it did, if people are living to 80 because of modern medicine, which is itself an extension of life, then the extra years of life from restricting food might be few.

As I've previously noted several times, some of the benefits of CR, either in animals or in humans, may be due merely to the prevention of obesity, so staying lean and in shape may confer many of the benefits of CR and allow someone to live much longer. While the average male lifespan is about 80 years, few of those people do much to stay in shape, or watch their diet. Or they get caught in the clutches of the medical system and end up on drugs that do as much harm as good.

Con: CR will not extend human lifespan by much, if at all

Animal experiments using CR may or may not tell us a lot about its effect in humans.

Most of the animals on which it has been tried live far shorter lives than humans. Rats and mice typically live 2 to 3 years, for instance. Since humans have already evolved to have much longer lives, it's not at all clear that CR (or any other intervention) can extend human lifespan to the degree it does in short-lived mammals.

The degree to which animals must have their food restricted is substantial. The following chart (ref) shows that to get, for example, a 20% increase in lifespan, food must be restricted by 25 to 35%. A 50% lifespan increase requires 40 to 60% less food — in rodents anyway.

How many humans have the desire or the ability to decrease their food intake to that degree? I know that I don't have either one.

Most of the studies of CR in animals have initiated food restriction very early in the animals' lives, often right after weaning. That's impossible in humans because it wouldn't be ethical and is probably very undesirable anyway.

Some scientists theorize that CR effects on growth and development may be crucial to the lifespan extension effect. That seems to be borne out by the fact that the later in life CR is started, the less effect it has on lifespan.

A model using a late-life start and extrapolating results to humans calculated that a 48-year-old man who restricted his food intake by 30% for 30 years would gain about 2.8 years of life. Not many people would say that that result would be worth the rigors of vastly less food.

Experiments indicate that animals undergoing CR are hungry all the time. When

given the opportunity to eat more, they eat ravenously and rapidly gain weight. It seems doubtful that many humans want to experience that. Many humans practicing CR report being cold all the time, as well as low libido, fatigue, lethargy – very undesirable effects.

Some scientists have suggested that the benefits of CR on lifespan are directly proportional to the diversion of life resources away from reproduction and toward life extension. Rodents use far more of their life resources for reproduction than humans, so if that is the case, CR might not work well in them.

In rodents, one of the major effects of CR is a reduction in cancer, a major killer of these lab animals. They tend not to die of heart disease. While cancer is the second leading cause of death in humans, heart disease is first, and if CR differentially affects these diseases, then it won't be as effective in humans.

Conclusion: CR is not a feasible plan for humans

Long-term food restriction is so unworkable and causes so many difficulties that few people will do it.

Furthermore, the benefits may be much more limited than seen in animals.

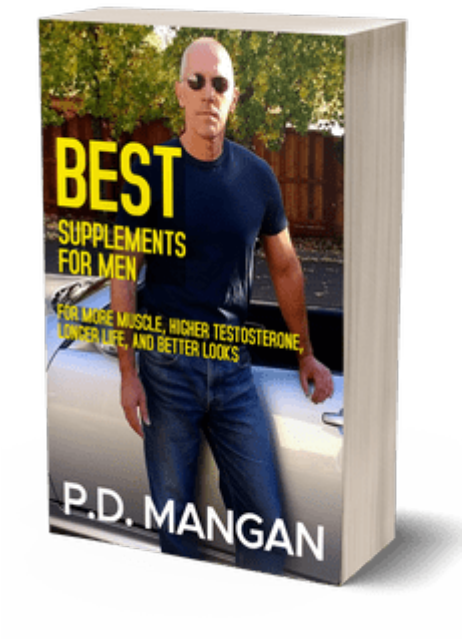
To be sure, avoiding obesity and maintaining a BMI in the low normal range means better health. But the obesity epidemic shows that even that goal isn't attainable for many, much less deliberately restricting food.

Probably any degree of restricting food, if only to the point of avoiding becoming overweight, is beneficial for health and prevents disease, but restricting it to the degree seen in animal experiments is extremely difficult and also undesirable.

CR mimetics, such as various drugs or plant compounds, show greater promise for life extension. For example, the diabetes drug metformin reproduces 75% of the gene expression of long-term calorie restriction, making it a CR mimetic, food restriction in pill form.

The most important result of CR experiments is that they have shown which biochemical pathways change under food restriction. With that knowledge, we can find drugs or other substances and interventions that imitate CR, without the unwanted side effects.

PS: Some supplements act as calorie restriction mimetics; find out about them in my new book, Best Supplements for Men.



PPS: [Check out my Supplements Buying Guide for Men.]