



## [Do Calorie Restriction, Fasting, and the Ketogenic Diet Have the Same Anti-Aging Effect?](#)

Calorie restriction (CR) is the most robust and effective life-extension intervention known, and intermittent fasting shows great promise in life extension as well. (I've written extensively about both [calorie restriction](#) and [intermittent fasting](#) on this site.) The question, unanswered so far, is how they work, although many possible explanations have been offered. Many pieces of evidence point towards the production of ketones as being the underlying, unifying factor, in which case calorie restriction, fasting, and the ketogenic diet have the same anti-aging effect.

### **Ketones mimic effects of calorie restriction**

[Ketogenic diets extend lifespan in lab animals](#). Does this diet extend lifespan through the same mechanisms as CR and fasting?

Consider that a reliable outcome of CR is the [production of ketones](#). [Intermittent fasting also results in ketone production](#), in fact, larger than calorie restriction. Obviously, ketogenic diets produce ketones also.

[Ketone bodies mimic the effects of calorie restriction](#). Ketone supplements do much, if not exactly, the same thing as a ketogenic diet. Ketones lower insulin signaling and blood glucose, key elements that have been shown to affect lifespan in all kinds of lab animals from yeast to *C. elegans* (a worm) to rats.

One of the biochemical pathways thought to be crucial in aging is [mTOR \(mechanistic target of rapamycin\)](#). [The ketogenic diet inhibits mTOR](#). Whether it inhibits it to the same degree of CR or fasting isn't known; likely much more research would be required to find out.

[The ketogenic diet stimulates mitochondrial biogenesis, as does CR and fasting.](#) It lowers oxidative stress by upregulating antioxidant defense mechanisms. [The ketogenic diet stimulates autophagy.](#)

The ketogenic diet is well known to result in loss of excess body fat, as are CR and fasting, and [reduction of excess body fat is thought to be a major mechanism of CR in lifespan prolongation](#). This aspect gives me a little pause in the comparison, because it's possible that, while ketogenic diets help fat loss, they don't universally decrease it to low levels. It's perfectly possible, although perhaps difficult, to gain fat mass on a ketogenic diet.

## What accounts for effects of CR

Are the effects of CR due to reduced calories in general, or reduced protein, carbohydrates, and fat? Or maybe CR is just a form of fasting, since [animals on CR eat all their food at once](#).

[Between 70% and 100% of the effects of fasting are due to carbohydrate restriction.](#)

The lower figure, 70%, comes from a study in diabetics in which they either fasted or ate a VLCKD (ketogenic diet) for 3 days. One could argue that had the experiment used a longer time period, the values for fasting and ketogenic diet may have converged, since benefits of zero carbohydrate intake usually take longer than a few days to manifest completely. (Although the study did show that you get instant benefits by restricting carbohydrate.)

The higher figure, 100%, comes from a study in which volunteers either fasted or fasted with a lipid infusion that gave them all their caloric requirements. There was no difference between the groups in plasma glucose, free fatty acids, ketone bodies, insulin, and epinephrine concentrations, which led the researchers to conclude: "These results demonstrate that *restriction of dietary carbohydrate, not the general absence of energy intake itself*, is responsible for initiating the metabolic response to short-term fasting." However, the researchers seem to have missed the fact that neither group of volunteers consumed any protein either, so their conclusion seems premature.

Many scientists in this field place great emphasis on protein restriction as important, for instance [Valter Longo and his fasting-mimicking diet](#). However, recent experiments have found [no effect of protein restriction on the metabolic and biochemical parameters affected by CR](#). Some data shows otherwise, but this major series of experiments by John Speakman and colleagues, and their null results with regard to protein restriction, cast serious doubt on the idea that it will prolong lifespan. For what it's worth, in my opinion protein could be important, but distinctly second in importance to restricting carbohydrates.

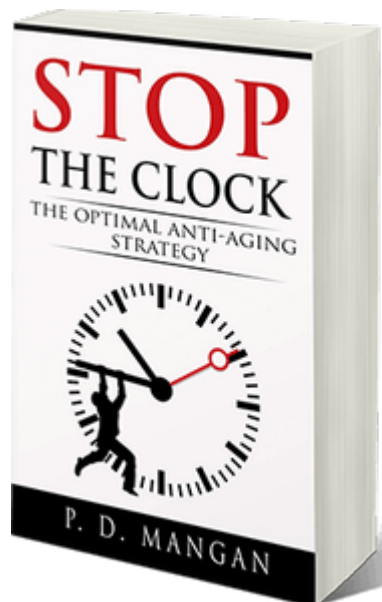
## Summary

Fasting and CR have a great deal in common with the ketogenic diet, with many

overlapping if not identical effects, including the extension of lifespan.

Is it even necessary to restrict calories or fast, or does one need merely to follow a ketogenic diet? While CR and fasting may offer benefits beyond the ketogenic diet, it seems probable that the ketogenic diet gets you at least ~90% of the benefits of CR and fasting.

**PS: For more on extending your lifespan, check out my book, [Stop the Clock](#).**



**PPS: [Check out my Supplements Buying Guide for Men.](#)**

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