



Intermittent Fasting: A Guide

What it is, why it works, and how to do it

by

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Dear Reader,

Thanks for downloading this guide to intermittent fasting. I'm P. D. Mangan, the proprietor of [Rogue Health and Fitness](#), a site dedicated to helping men lose fat, gain muscle, attain and maintain excellent health and energy levels, and to live their maximum lifespan free of illness and the debilities of age. I started the site as a means to share the knowledge that I learned on my journey from illness and chronic fatigue to good health and a fit body.

One of the reasons I used the word “rogue” in my site's name is because we have gone rogue against mainstream health and fitness advice, 90% of which is, frankly, garbage.

Intermittent fasting is one of those processes which the mainstream denigrates but which in reality leads to good health, anti-aging, and fat loss.

Read on for my guide to intermittent fasting.

Best,

P. D. Mangan

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Intermittent fasting is the simplest, easiest diet plan

With the combined overweight (Body Mass Index, or BMI, ≥ 25) and obese (BMI ≥ 30) categories making up around 70% of the American population currently, weight loss and dieting are hot topics, and more urgent than ever.

The main theme of virtually all of the multitude of diet books on the market is how to cut calories, since if you eat fewer calories than you expend, you'll lose weight. This is the so-called "calories in, calories out", or CICO, model of weight loss, which is simple, clear, and mostly wrong. While you must expend more calories than you take in in order to lose weight, *how* to do this is the main question. If it's a matter of cutting your calories, or counting them, or some other way, why do so many people – virtually everyone – fail at long-term weight loss?

CICO clearly has things backward. If your house burned down, you wouldn't say that it did so because it ignited – that's obvious. For your house to burn down, it *must* ignite. That doesn't tell you the important thing – *how* it ignited.

Likewise, to lose weight, you must expend more calories than you consume – but how you do that is the important question. If it were just a matter of counting calories, that would work, but the fact that virtually everyone fails when they try this should tell you something is wrong.

The biggest hurdle for fat loss is hunger. Obviously, if hunger wasn't such a powerful drive, urging you to eat when your conscious mind tells us not to, then fat loss would be no big deal.

That's one reason CICO doesn't work: cut your calories, and soon you'll be hungry enough that you won't be able to sustain your fat loss resolution. You'll grab the first food available and eat it.

Another reason CICO is grossly ineffective is that if you cut calories, your body knows this and will slow your metabolism – the rate at which you burn calories – down.

And yet a third reason CICO doesn't work is that if you try the approach from a different angle, by increasing the rate at which you expend calories – mainly through exercise – you get hungrier and eat even more.

The secret about exercise that the weight-loss industry doesn't want you to know is that

exercise makes you hungry. In the old days – 19th century – they used to say that if you wanted to gain weight, you should exercise, and to lose weight, be sedentary. They may have known something in those days.

Where the CICO model is correct is that if you eat less, and keep energy expenditure the same, you'll lose fat.

Diet plans focus on this aspect of fat loss: how to eat fewer calories, either by counting them or focusing low-calorie foods or smaller portions.

But what's the easiest way to consume fewer calories?

Answer: don't eat at all. This is where intermittent fasting comes in.

Intermittent fasting means simply going without food for a given length of time. After you've done a period of fasting, you can then eat during a certain amount of time, the "feeding window". Then when you're ready, you fast again. Fasting and feeding in this way can be done daily, or, if the fasting window is long, once or several times a week. Some people do it daily.

Intermittent fasting has almost as many variations as there are people who implement it, but there are some basic versions of it that I'll show you here, as well as minimum criteria for what constitutes an intermittent fast.

The benefits of intermittent fasting don't end with fat loss either. *Intermittent fasting has profound anti-aging effects, it can increase insulin sensitivity and mitochondrial function, and generally conduces to good health.* We'll discuss those later, toward the end of this guide.

The origins of fasting, and what's wrong with mainstream diet and eating practices

Most of the world's religions, including Judaism, Buddhism, Christianity, and Islam, have prescribed fasting for millennia as a means to become more spiritual. In the medical realm, fasting has been known as a treatment for epilepsy and other disorders

since the time of Hippocrates over 2,000 years ago. Only very recently has this practice begun to receive the attention of biomedical researchers, and what they've found is that fasting can have profoundly beneficial effects on health.

Mainstream dietary advice and common custom claim that you must eat more or less every few hours, so most people eat three (or more) meals plus snacks every day. Over the past few decades, mainstream diet authorities have even advised that you should eat small amounts almost constantly, a practice that has come to be known as grazing. The idea behind grazing is that one will keep blood sugars in a normal range and metabolism high by eating all the time.

Grazing is among the worst dietary advice ever given, since by keeping the hormone insulin at higher levels constantly, and encouraging higher caloric intake, all it does is make people fat. Besides that, grazing never allows the normal bodily rhythm of feeding and fasting to take place. With grazing, we're always in what scientists refer to as the “fed state”. Blood sugar and insulin rise when you eat, and if you graze, they never completely decline, which leads to fat deposition.

Fasting is the polar opposite of grazing.

To understand how fasting confers its benefits, we need to understand how humans and the ancestors of humans evolved, and what it was like to live in the era in which our genes were shaped to give us life and health.

Humans have lived in the hunter-gatherer phase, as opposed to the agricultural or industrial phase, for approximately 99% of their existence. In that hunter-gatherer phase, food had to be found and either killed or picked or dug up, and then cooked, before it could be eaten. Since there was no refrigeration, canning, or any other means of food preservation beyond smoking or drying, hunter-gatherers simply could not eat whenever they wanted to, in contrast to today.

Among surviving hunter-gatherer tribes that have been studied, and using data from historical records, we've discovered that the usual practice among these peoples was (or is) to hunt and gather during the day, and to eat a large meal at night after the food had been prepared.

Hunter-gatherers do not eat breakfast, lunch, dinner, and snacks. As a result, these people are lean, fit, and do not die of the diseases of civilization like heart disease and

diabetes.

Intermittent fasting is the natural rhythm of eating of primitive peoples. Could we perhaps learn something from that?

It was that era of strong alternations between feeding and fasting, which lasted perhaps a couple million years, to which our genes are adapted.

When we live in a way to which our genes are not adapted, we experience illness, including diabetes, obesity, cancer, heart disease, arthritis, gout, acne, and many others.

Why fasting promotes health: the case of calorie restriction

As we noted, it's been known for thousands of years that fasting can promote health. Yet science couldn't provide a satisfactory answer as to the cause of fasting's effects on health. The knowledge that fasting was good for us and could treat certain illnesses came strictly from observations of its effects on individuals.

With the development of the modern scientific method, scientists could probe the effects of intermittent fasting. But they first discovered the effects of giving animals less food.

With the use of laboratory animals, scientists studying aging discovered that restricting food by 30% or more allowed animals to live much longer than when they were fed *ad lib*, that is, allowed to eat as much as they wanted. The scientist Clive McCay gets the credit for discovering the anti-aging effects of limited feeding, or as it's commonly known, calorie restriction.¹ He discovered this in the 1930s.

Scientists have since extensively tested the effects of calorie restriction (CR), and we now know that *CR is the most robust anti-aging process there is*.² It appears to be effective on virtually every animal tested, from yeast and worms to rodents and primates.

The reasons for the effects of CR are still intensively researched, and the details need not detain us here, except to say that CR causes a stress response in the organism that leads

¹McDonald, Roger B., and Jon J. Ramsey. "Honoring Clive McCay and 75 years of calorie restriction research." *The Journal of nutrition* 140.7 (2010): 1205-1210.

²Guarente, Leonard. "Calorie restriction and sirtuins revisited." *Genes & development* 27.19 (2013): 2072-2085.

to better health and longer life. Stress that leads to better health is known as *hormesis*.

CR has some fairly serious drawbacks, however. One is that animals that are forced to do with less food are hungry all the time. When fed, they eat their food all at once.

Experiencing a constant state of hunger is not something most people want to do. I don't, for example, and I presume that the reader feels the same way. Withstanding constant hunger requires an iron will, besides being unpleasant. And recall that constant hunger is one of the reasons that calorie-counting fails with such regularity.

Another drawback is that people who restrict their calories report feeling cold all the time due to a lower metabolic rate, and they often report less energy, lower libido, and just all around not feeling so great.

And finally, constant calorie restriction, especially if not done precisely and perfectly, can lead to frailty, muscle and bone loss, and lower immune function.³

Fortunately, a method that has *all the benefits of CR but virtually none of the drawbacks* has been found, and that method is intermittent fasting.⁴ Animals that are fasted intermittently eat virtually the same amount of food as *ad lib* fed animals, they merely eat that food at different times. Frailty, lowered immune function, or wasting of muscle and bone is therefore not an issue with fasting. Neither is feeling cold, or having a low sex drive.

Even while consuming the same amount of food, intermittent fasting decreases blood sugar and insulin levels, which means that insulin resistance, the prime culprit in diabetes and obesity, decreases. And since diabetes is associated with much higher risks of heart disease and cancer, the insulin-lowering effect of intermittent fasting decreases the risk of these diseases.

Intermittent fasting also increases the resistance of neurons to excitotoxic injury, which happens because it increases stress defense mechanisms in the brain and nervous system.

Fasting also increases levels of brain-derived neurotrophic factor (BDNF), which has beneficial effects on mood and cognition, which may be why fasting has so often been recommended by the world's religions. BDNF also improves glucose metabolism and

³Goldberg, Emily L., et al. "Lifespan-extending caloric restriction or mTOR inhibition impair adaptive immunity of old mice by distinct mechanisms." *Aging cell* 14.1 (2015): 130-138.

⁴Anson, R. Michael, et al. "Intermittent fasting dissociates beneficial effects of dietary restriction on glucose metabolism and neuronal resistance to injury from calorie intake." *Proceedings of the National Academy of Sciences* 100.10 (2003): 6216-6220.

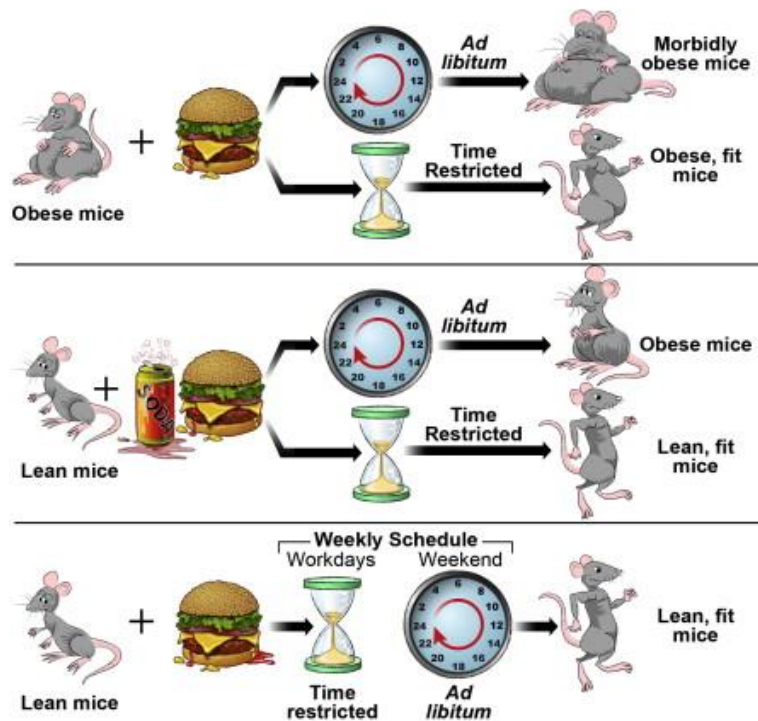
mitochondrial energetics, and may even increase brain volume.

Animals maintained on a fasting regimen show increased resistance to myocardial infarction (heart attack) and stroke.⁵

Of great interest to most people is the power of intermittent fasting to fight obesity.⁶ In one scientific study, animals, in this case mice, were maintained on “time-restricted feeding”, that is, a feeding window of 9 to 12 hours during which they could eat as much as they wanted. The obverse of this is that from 12 to 15 hours a day they were allowed to eat nothing. Mice that were bred to be genetically obese became fitter while on this fasting regimen. In lean-bred mice, those that were allowed to eat *ad lib* became obese, but the mice on the fasting regimen remained lean and in good shape. And finally, some lean mice were put on an intermittent fasting regime of 15 hours daily on weekdays, and *ad lib* feeding on weekends, and they remained lean and fit. See an illustration of the results below.

⁵Mattson, Mark P., and Ruiqian Wan. "Beneficial effects of intermittent fasting and caloric restriction on the cardiovascular and cerebrovascular systems." *The Journal of nutritional biochemistry* 16.3 (2005): 129-137.

⁶Chaix, Amandine, et al. "Time-restricted feeding is a preventative and therapeutic intervention against diverse nutritional challenges." *Cell metabolism* 20.6 (2014): 991-1005.



Results of maintaining mice on various intermittent fasting regimens.

Human data on intermittent fasting

I'm sure the reader would like to know whether these results would apply to himself or to humans generally rather than just mice. Humans and mice share mammalian biochemistry and physiology, so as we would expect, science shows that humans benefit from intermittent fasting too.

As long ago as 1962, a group of doctors used intermittent fasting for “Correction and Control of Intractable Obesity”.⁷ The doctors found that total fasting caused a weight loss of about 2.5 pounds (1.1 kg) a day. The obese subjects fasted for several days at a time; after satisfactory weight loss, the study group found that shorter periods of fasting were enough to maintain the weight loss.

Notably, the group stated, “Anorexia was the rule after the first day of fasting and

⁷ Duncan, Garfield G., et al. "Correction and control of intractable obesity: practicable application of intermittent periods of total fasting." *JAMA* 181.4 (1962): 309-312.

paralleled the degree of hyperketonemia.” What this means in layman’s terms was that, after the first day, the subjects lost their appetite, and they did so to the degree that ketones appeared in their blood.

This shows that in intermittent fasting, hunger is much less of an issue than with dieting.

Ketones are a response to either fasting or a very low carbohydrate diet; the body produces and uses them from stored fat when the lack of carbohydrates means that there’s no glucose available. This has the salutary effect of sparing muscle tissue.

Ketones also prolong lifespan in animals, so ketones are likely one of the ways in which calorie restriction and fasting promote health.

Also notable in the use of fasting in humans, “A sense of well-being was associated with the fast.” The subjects felt good.

More recently (2011), a review of the effectiveness of intermittent fasting versus daily calorie restriction (i.e. a standard reducing diet) found that fasting was at least as effective as diet, with the important proviso that *fasting caused less muscle loss than dieting*.⁸

This result is very important, since standard dieting typically causes the loss of lots of muscle; the rule of thumb is that one-fourth to one-third of weight loss due to dieting is lean mass, mostly muscle. Muscle loss is an unhealthy process, as losing muscle means having less of one of the body’s most metabolically active tissues. In most cases, dieters who lose muscle will never get that muscle back, unless they are very dedicated, lift weights and eat right. Better not to lose muscle in the first place.

With intermittent fasting, muscle loss is much less of a problem. If you combine intermittent fasting with a couple or more sessions a week of weight training, virtually no muscle loss will occur; all the weight loss is fat. This is much healthier than regular dieting, since fat tissue leads to metabolic ill health, and more muscle makes for better metabolic health – better insulin sensitivity, control of blood sugar, better aerobic capacity.

I wrote at length on the relation between muscle and good health in my book [Muscle Up](#) (2015).

Fasting is just so much simpler and, in many ways, easier than standard, calorie-reduced

⁸ Varady, K. A. "Intermittent versus daily calorie restriction: which diet regimen is more effective for weight loss?." *Obesity Reviews* 12.7 (2011): e593-e601.

diets. Instead of constantly thinking about, and planning for, the next meal, fasting merely requires a set time without food. This eliminates a great deal of the psychological difficulty in dieting.

Furthermore, as noted above, the longer you fast, the less hungry you are. This result seems counterintuitive, and it seems like most people, when they first hear of fasting, think it's crazy, so brainwashed we've become in thinking we need to eat every few hours.

Almost everyone eats constantly, and you can see for yourself what the average person looks like, so to lose fat and become lean and fit, you should do the opposite of what most people do.

How intermittent fasting slows aging

Calorie restriction, as we've seen, has remarkable health benefits, and intermittent fasting improves on those benefits in a number of ways, mainly by being far more practical and avoiding the downsides of possibly inadequate nutrition. Since calorie restriction slows aging and increases lifespan, is it possible that fasting could do the same?

Yes, it is not only possible, but highly probable.

One way in which CR slows aging is through increasing the levels of the basic cellular self-cleaning process, which is known as autophagy.⁹ In autophagy, which is from the Greek for “self-eating”, cells produce specialized structures that “eat” parts of themselves, and the parts that are selected for eating are cellular “junk”: misfolded proteins, old mitochondria, and other cellular organelles that have passed their expiration date.

The accumulation of cellular junk is a hallmark of aging, as is the declining ability of cells to induce autophagy and rid themselves of junk.

⁹Morselli, E., et al. "Caloric restriction and resveratrol promote longevity through the Sirtuin-1-dependent induction of autophagy." *Cell death & disease* 1.1 (2010): e10.

Youthful organisms have the full ability to induce autophagy and free themselves of junk, thus maintaining youthful structure and function. As they age, organisms including humans decline in the ability to induce autophagy. The result is aging cells and declining function.

Autophagy is strongly induced by lack of food. In young animals, such as humans, the natural rhythm of fasting overnight – you don't eat while you're asleep – strongly promotes autophagy, such that its maximum rate occurs early in the morning, before eating. In older animals, this natural rhythm is greatly reduced.

Fasting can help restore youthful levels of autophagy. The longer the fast, the more strongly autophagy will be induced.¹⁰

Animals that have been genetically altered to increase their levels of autophagy live longer than normal animals.¹¹

By inducing autophagy, intermittent fasting slows aging and protects against disease.

Fasting can even induce autophagy in neurons, in the brain, and therefore protects against the development of neurological diseases like Alzheimer's, Parkinson's, and other forms of dementia and cognitive decline.¹² Therefore fasting fights against one of the chief fears that people have of aging: mental decline, along with the nursing home and total helplessness.

Aging greatly increases the risk of cancer, and intermittent fasting has the potential to lower that risk.¹³ Fasting decreases blood glucose levels, and this is highly significant for cancer because cancer cells use glucose as their main energy supply. When people eat constantly, especially when they eat lots of refined carbohydrates, they give tumor cells plenty to feed on. Intermittent fasting can cut cancer's food supply while allowing other cells to have energy access.

Thomas Seyfried, a scientist noted for his work on cancer as a metabolic disease, notes that a ketogenic diet has the potential to treat brain cancer.¹⁴ In the ketogenic diet, carbohydrates are radically restricted, and as a consequence, ketone bodies are produced

¹⁰Levine, Beth, and Guido Kroemer. "Autophagy in the pathogenesis of disease." *Cell* 132.1 (2008): 27-42.

¹¹Vellai, T. "Autophagy genes and ageing." *Cell Death & Differentiation* 16.1 (2009): 94-102.

¹²Alirezaei, Mehrdad, et al. "Short-term fasting induces profound neuronal autophagy." *Autophagy* 6.6 (2010): 702-710.

¹³Lankelma, Jan, et al. "A reason for intermittent fasting to suppress the awakening of dormant breast tumors." *Biosystems* 127 (2015): 1-6.

¹⁴Zhou, Weihua, et al. "The calorically restricted ketogenic diet, an effective alternative therapy for malignant brain cancer." *Nutr Metab (Lond)* 4.5 (2007): 5.

by the liver from fat in order to provide an alternative cellular fuel in place of glucose. Where fasting comes in here is that it also has the ability to produce ketone bodies, and thus may help prevent and treat cancer, basically by starving it into submission.

Another way that intermittent fasting combats aging is through its action on stem cells. These cells represent a reservoir, or back-up, of cells that can differentiate into new tissue cells, for example, muscle or bone cells. In aging, the number and strength of stem cells declines, and therefore tissues can't be properly renewed as they can in younger people.

Autophagy, the cellular junk-clearing mechanism, maintains stem cells.¹⁵ As intermittent fasting strongly increases autophagy, it will also strongly maintain the quantity and quality of stem cells, keeping the organism biologically younger.

Mark Mattson, a scientist who studies aging, practices intermittent fasting himself, since he knows that it's a healthy practice that retards aging. He claims not to have had breakfast for the past 35 years, and he confines his entire daily eating window to 6 hours.¹⁶ Mattson stated, "Once you get used to it, it's not a big deal. I'm not hungry at all in the morning, and this is other people's experience as well. It's just a matter of getting adapted to it."

Intermittent fasting and muscle

One question that men who lift weights or exercise generally have is whether intermittent fasting will affect their muscle mass. Most bodybuilding advice regarding diet claims that you should always be well fed, even to the extent of taking protein before bedtime, or even to the extreme of eating in the middle of the night. Obviously, if you practice intermittent fasting with any regularity, you won't be doing this.

The good news is that fasting can actually promote muscle growth.

As noted above, fasting strongly promotes the cellular process of autophagy, and

¹⁵ García-Prat, Laura, et al. "Autophagy maintains stemness by preventing senescence." *Nature* 529.7584 (2016): 37-42.

¹⁶ <http://mobile.nytimes.com/blogs/well/2016/03/07/intermittent-fasting-diets-are-gaining-acceptance/>

autophagy is required for the functional capacity of muscle.¹⁷ Calorie restriction, of which intermittent fasting is a temporal variation, protects against muscle wasting (sarcopenia) in aged animals.¹⁸

During fasting, the production of growth hormone greatly increases.¹⁹ Meals actually dampen growth hormone production. The result of increased growth hormone during fasting is the protection of skeletal muscle from breakdown.

Later, we'll discuss how you can best integrate intermittent fasting into an exercise program, so that you can ensure maximum muscle growth and fat loss, along with good exercise recovery.

Before we discuss how you can fast intermittently, and how you can integrate it with your daily life, including exercise, let's take a look at a different sort of fasting, prolonged fasting.

Prolonged Fasting

The borderline between intermittent and prolonged fasting is necessarily arbitrary, but for the purposes of this discussion, I'll define prolonged fasting as anything longer than 24 hours.

Prolonged fasting has been notably advocated and studied by Valter Longo, a scientist at the University of Southern California who researches aging.

Longo, along with another noted scientist in the field, Mark Mattson, wrote the following about fasting:

Fasting has been practiced for millennia, but, only recently, studies have shed light on its role in adaptive cellular responses that reduce oxidative damage and inflammation, optimize energy metabolism, and bolster cellular protection. In lower eukaryotes, chronic fasting extends longevity, in part, by reprogramming metabolic and stress resistance pathways. In rodents

¹⁷Neel, Brian A., Yuxi Lin, and Jeffrey E. Pessin. "Skeletal muscle autophagy: a new metabolic regulator." *Trends in Endocrinology & Metabolism* 24.12 (2013): 635-643.

¹⁸Marzetti, Emanuele, et al. "Sarcopenia of aging: underlying cellular mechanisms and protection by calorie restriction." *Biofactors* 35.1 (2009): 28-35.

¹⁹Ho, Klan Y., et al. "Fasting enhances growth hormone secretion and amplifies the complex rhythms of growth hormone secretion in man." *Journal of Clinical Investigation* 81.4 (1988): 968.

intermittent or periodic fasting protects against diabetes, cancers, heart disease, and neurodegeneration, while in humans it helps reduce obesity, hypertension, asthma, and rheumatoid arthritis. Thus, fasting has the potential to delay aging and help prevent and treat diseases while minimizing the side effects caused by chronic dietary interventions.²⁰

Prolonged fasting works largely by lowering the levels of insulin-like growth factor 1, or IGF-1, a growth hormone. In growing animals, IGF-1 helps regulate growth, but after maturity, it acts as a pro-aging hormone, and lowering it has anti-aging effects.

Prolonged fasting can act against cancer by retarding growth of tumors and sensitizing cancer cells to chemotherapy.²¹ In humans, prolonged fasting reduces the incidence of side effects to chemotherapy.²²

Longo and colleagues recently studied a so-called fasting-mimicking diet (FMD).²³ The idea here is that prolonged fasting of several days is difficult for most people to adhere to; letting people eat a small amount of food instead of complete fasting for a few days increases compliance with the regimen. But of course, it's not complete fasting, so does it work?

Yes, it does. The study had three facets, and looked at the effects of several days long, low-caloric intake on yeast, mice, and humans. In mice,

Bi-monthly FMD [fasting-mimicking diet] cycles started at middle age extended longevity, lowered visceral fat, reduced cancer incidence and skin lesions, rejuvenated the immune system, and retarded bone mineral density loss. In old mice, FMD cycles promoted hippocampal neurogenesis, lowered IGF-1 levels and PKA activity, elevated NeuroD1, and improved cognitive performance.

To reiterate, the FMD lowered levels of fat, increased lifespan, reduced cancer, and

²⁰Longo, Valter D., and Mark P. Mattson. "Fasting: molecular mechanisms and clinical applications." *Cell metabolism* 19.2 (2014): 181-192.

²¹Lee, Changhan, et al. "Fasting cycles retard growth of tumors and sensitize a range of cancer cell types to chemotherapy." *Science translational medicine* 4.124 (2012): 124ra27-124ra27.

²²Safdie, Fernando M., et al. "Fasting and cancer treatment in humans: A case series report." *Aging (Albany NY)* 1.12 (2009): 988.

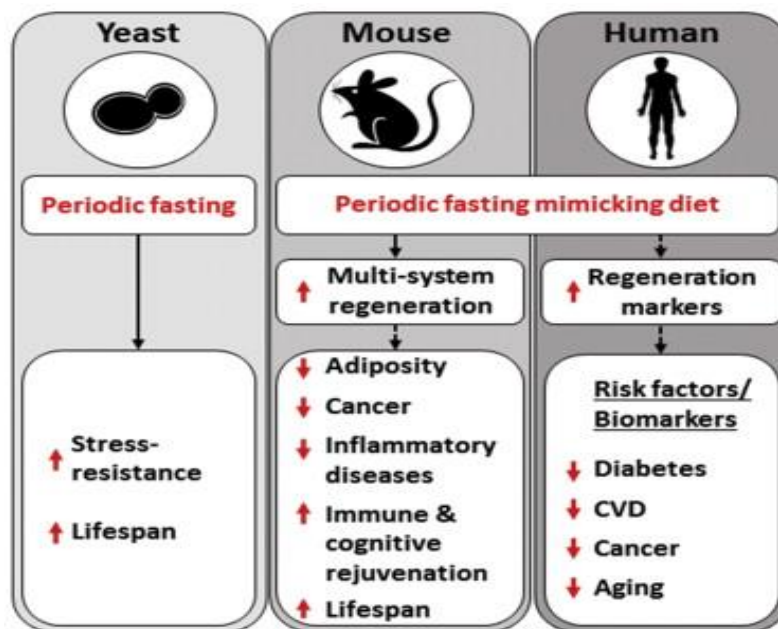
²³Brandhorst, Sebastian, et al. "A Periodic Diet that Mimics Fasting Promotes Multi-System Regeneration, Enhanced Cognitive Performance, and Healthspan." *Cell metabolism* (2015).

rejuvenated the immune system.

In humans,

three FMD cycles decreased risk factors/biomarkers for aging, diabetes, cardiovascular disease, and cancer without major adverse effects, providing support for the use of FMDs to promote healthspan.

Following is a graphical representation of the results of the FMD.



In the human subjects of the FMD, C-reactive protein levels decreased. C-reactive protein is a marker for inflammation, and high levels are an indication of risk of coronary artery disease. Of the subjects, 9 of them had high levels of C-reactive protein, so they were considered to have a higher risk of heart disease, and in 7 of those 9, levels became completely normal. Thus the FMD lowers the risk of heart disease.

The FMD also reduced blood glucose levels by 11%, and ketone bodies rose 3.7-fold, so the FMD shows excellent promise in the prevention of cancer, as well as diabetes. The subjects lost 3% of their body weight, and almost all of this was fat, not muscle, which

shows the potential of the FMD and of fasting in general for weight loss and for the preservation of muscle.

The fasting-mimicking diet consisted of about 1000 calories on day one, and only 725 calories on days 2 to 5. It was about 10% protein, 56% fat, and 34% carbohydrates. Even with the carbohydrates, the calorie content was low enough that a state of ketosis was induced.

A crash diet cures diabetes in one week

Since we're speaking of the ability of very low-calorie diets of at least several days' duration to mimic the effects of fasting, it's worthwhile to bring up a similar case.

Eleven obese people with type 2 diabetes were put on a crash diet of 600 calories a day, and after a mere one week, blood glucose levels had become normal, as did triglycerides.²⁴ Normal insulin sensitivity and beta cell function was achieved, indicating that these people had essentially been cured of diabetes.

These people were placed on a fasting-mimicking diet, which is all a crash diet really is.

All of this shows the power of food to either give us health or make us ill. A reduction in food intake either through fasting or a very low-calorie diet has tremendous capacity for curing us of our ills. Physicians of old knew this, and this practice, more scientifically based to be sure, is only now coming back into the knowledge and practice of modern-day doctors.

Of course, you don't need to ask your doctor for permission to fast – although if you have any serious illness, or take any medications, you should ask. For the rest of us who are generally healthy, fasting has few side effects and is low risk. Let's see how one can implement intermittent – or prolonged – fasting.

²⁴Lim, Ee Lin, et al. "Reversal of type 2 diabetes: normalisation of beta cell function in association with decreased pancreas and liver triacylglycerol." *Diabetologia* 54.10 (2011): 2506-2514.

How to implement intermittent fasting

Intermittent fasting has about as many variations as there are people who practice it. There are practical limitations of course, and minimum durations, so let's look at both of these.

In the old days, before the rise of fast-food restaurants and convenience foods, meals had to be prepared at home, almost always by the wife and mother of the household, and this took plenty of work. In the even older days, refrigeration did not exist, and consequently, food storage and preparation were even more laborious.

Because of this, most people had a natural daily rhythm of fasting, and it lasted from dinner in the evening (or supper, for some of you in other parts of the country) to breakfast in the morning. I'm sure that many a reader can recall their mother saying something along the lines of, "Better eat your dinner, there won't be anything until breakfast!" I remember it, anyway.

The up-regulation of autophagy, the cellular self-cleaning process, is one of the chief benefits of intermittent fasting, and going without food all night strongly increases it, at least in normal, relatively healthy, and youthful animals and humans.

If we somewhat arbitrarily define the overnight fasting period as lasting 12 hours, from 6:00 P.M. to 6:00 A.M., then this is our minimum fasting duration. Going without food for less than 12 hours does not constitute fasting, since you are in what scientists call the fed state, during which time your body is digesting food. The constituents of that food then circulate in the bloodstream to nourish muscles and organs.

We can leverage overnight fasting for our intermittent fasting regimen in two ways. One, most people do not get hungry overnight; after all, you're asleep, and unless you become ravenous, sleep overrides hunger. Two, since the overnight fast strongly promotes autophagy, and this process is going strong by the early hours of the morning, we've got a jump start on our fast by starting it after the meal on the previous evening.

This is, in my opinion, the best basis for intermittent fasting. If you get up in the morning at 6:00 A.M., and you ate dinner 12 hours earlier, you've already got 12 hours of fasting under your belt. Now you just need to add a few more hours and you're done.

Perhaps the most common variant of intermittent fasting is one of 16 hours, and this variant is one that I often practice. In this 16-hour fast, you skip only one meal,

breakfast. This fast is pretty easily extended to 18 hours, if you ate dinner at 6 the night before, and don't eat lunch until noon the next day.

Occasionally I've extended my fasts until late in the afternoon, making a fast of 20 to 22 hours. Many people fast for 24 hours, and do this repeatedly, eating only one (evening) meal a day. (Eating one meal instead of three has been shown to cause fat loss, lower cortisol levels, and higher HDL levels, all good things.²⁵)

Many people worry that they will be tormented by hunger during their fast, but what normally happens is that hunger goes away, and even more so the longer the fast lasts. This may be a consequence of increased blood ketones, which rise when fasting, and in particular when not ingesting carbohydrates.

Drinking coffee and/or tea can greatly ease fasting by reducing sensations of hunger, and I consider them an absolute must for my fasting. So the question naturally arises, do coffee and tea interrupt or negate a fast, and what other forms of calories might do this?

Coffee and tea – and water of course – contain no calories, so they will not disrupt a fast. On the contrary, they enhance it, since both coffee and tea have been shown to increase autophagy, the cellular self-cleansing process.^{26,27} Small amounts of fat do not increase insulin response, and therefore do not disrupt autophagy, so small amounts of cream in your caffeinated beverage of choice will not spoil your fast.

Bulletproof Coffee has been trending strongly lately, and many people wonder about using it for fasting. Bulletproof Coffee is coffee that has been blended with fairly large amounts of butter and either coconut oil or MCT (medium-chain triglycerides) oil. Obviously, no controlled scientific studies have been done on Bulletproof Coffee, and while in theory the fat in this coffee will not activate the insulin response, an important component of fasting – its inactivation, that is – the rather large amounts in it make me question whether it's a good thing to use for fasting purposes. Many people use it to lose weight, since it can kill the appetite and allow you to go for many hours without eating, but whether it interferes with the beneficial health effects of fasting is an open question at this point. I don't use Bulletproof Coffee myself, although I sometimes take a small amount (a teaspoon) of MCT oil when I fast.

²⁵Stote, Kim S., et al. "A controlled trial of reduced meal frequency without caloric restriction in healthy, normal-weight, middle-aged adults." *The American journal of clinical nutrition* 85.4 (2007): 981-988.

²⁶Pietrocola, Federico, et al. "Coffee induces autophagy in vivo." *Cell Cycle* 13.12 (2014): 1987-1994.

²⁷Zhou, Jin, et al. "Epigallocatechin-3-gallate (EGCG), a green tea polyphenol, stimulates hepatic autophagy and lipid clearance." *PloS one* 9.1 (2014).

As we see, skipping breakfast is the best strategy for a fast of 16 hours or so. If you eat breakfast and skip lunch, and then eat dinner later, you will negate many of the benefits of fasting, since the longest you would go without eating is about 12 hours.

Longer fasts are merely an extension. I know people who have fasted for up to 4 days, and they've told me that after day 1, it gets easier, with hunger pretty much disappearing. This may be an effect of elevated blood ketones, which provide an alternate energy source and possibly kill hunger.

Alternate-day fasting is the other popular method of fasting. In alternate-day fasting, days of feeding alternate with days of fasting. Usually on the fasting day, only one small meal is eaten, often at mid-day.

Someone with a lot of weight to lose could alternate days of fasting with days of feeding continuously. Others may find that they only can or need to fast on one or two days a week.

Alternate-day fasting may require somewhat more willpower than a 16-hour fast, since psychological cues to eating are strong.

Speaking of psychological cues to eating, they're one of the main hindrances to fasting. If you're used to eating breakfast at a certain time every day, for instance, overcoming that psychological urge to eat may be difficult at first. If you're heading off to work in the morning, you may worry that you'll get hungry by mid-morning and then have nothing to eat. Or worse, only garbage food to eat.

The best thing to do in that case is to make the leap and try it. You'll find that these psychological barriers are not difficult to overcome. Don't use food as entertainment.

It's also best not to be distracted by food when fasting. Don't have it around, if possible. The best time to fast is when you're busy with work or some other activity, as you then are much less likely to think of food and to break your fast. Staying busy also means that you'll be less able to focus on hunger and the prospect of eating.

The world record for fasting is held by a man who went for 382 days without food.²⁸ He was obese when he started, and his weight dropped from 456 to 180 pounds. Five years after the fast, he weighed 196. It goes without saying that he was medically supervised, as this type of thing should be. However, he appeared to suffer little in the way of ill

²⁸Stewart, W. K., and Laura W. Fleming. "Features of a successful therapeutic fast of 382 days' duration." *Postgraduate medical journal* 49.569 (1973): 203-209.

effects.

Speaking of ill effects, who should do fasting under a doctor's supervision? Generally, as noted, fasting is safe, but those who suffer from diabetes, heart disease, cancer, or any other serious health problem should definitely consult their doctor first. Dosages of medications may need to be adjusted, and in some cases a doctor may veto fasting.

Autophagy enhancement

We've noted several times in this document that up-regulation of autophagy is one of the chief health benefits of fasting. It turns out that a number of supplements also activate autophagy: these are the so-called calorie-restriction mimetics.²⁹

Among these calorie-restriction mimetics are nicotinamide, resveratrol, and EGCG (from green tea).

These non-toxic substances enhance autophagy by various mechanisms, but in general they act through the same molecular pathways as does calorie restriction and intermittent fasting. These compounds thus have the potential to improve health through their mimicry.

When we fast, we can also use them to boost the autophagy process. The presence of food, or being in the fed state, could diminish the effects of these compounds. Therefore, if you decide to use them, they should be taken during a fast.

Nicotinamide – no relation to nicotine, and often sold as niacinamide – is a form of vitamin B3. Niacin, the other version of vitamin B3, has been used for decades to lower lipid levels, but nicotinamide does not have that effect. It is known to enhance autophagy.

Resveratrol and curcumin are two other compounds known for life extension in experimental animals, and they also increase autophagy. I often take resveratrol and sometimes curcumin. Resveratrol especially may be able to inhibit mTOR, an important mechanism in muscle growth, so I skip it on my gym days, although I suspect that the

²⁹Madeo, Frank, et al. "Caloric restriction mimetics: towards a molecular definition." *Nature Reviews Drug Discovery* (2014).

effect is too small to notice.

EGCG is a compound found in green tea, and it promotes autophagy. The beauty part here is that you can drink green tea while fasting and get extra health benefits. While a capsule of concentrated green tea extract typically has no more EGCG than a cup of strong green tea, there have been some reports of toxicity using it, so just drinking green tea is probably a better choice.

Black tea appears to have the same level of health benefits of green tea.

Other commonly used substances can inhibit autophagy, and these should not be taken during fasting. Most notable in this regard are vitamins C and E. A great deal of recent research has shown that vitamins C and E can diminish the health benefits of exercise, if taken daily in fairly large amounts. One gram of vitamin C daily is enough to do this. As for fasting, it's been shown that many of the benefits of calorie restriction – and presumably intermittent fasting – come from the stress response of the organism, specifically the response to free radicals or reactive oxygen species. Vitamins C and E blunt this response.

Many of the effects of these vitamins are unknown in this regard, and the effects are quite possibly minor, but just to be on the safe side, and since it's no big deal to take them when fed and not working out in the gym, I recommend avoiding them while fasting.

Intermittent fasting can change your life

I hope you've gotten value from this guide to intermittent fasting. Based on what I've set out above, I can say that fasting can change your life. It has the power to help prevent many illnesses, including cancer, heart disease, and diabetes, it can spur on weight (fat) loss, and it retards the aging process.

I wrote about intermittent fasting and its connection to the slowing of aging in my book, [Stop the Clock: The Optimal Anti-Aging Strategy](#), so for further information, check it out. You can also read more about fasting and about other health and anti-aging strategies at my website, [Rogue Health and Fitness](#).

My other books include [Dumping Iron: How to Ditch This Secret Killer and Reclaim](#)

[Your Health and Best Supplements for Men.](#)