

## Fasting by Dr Mericola

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### Story at-a-glance

Intermittent fasting can help you take your fitness goals to the next level, if you're already on a healthy fitness plan. Modern science also suggests it may be a key to successful weight loss

Exercising on an empty stomach has been shown to have a number of health and fitness benefits as the combination of fasting and exercising maximizes the impact of cellular factors and catalysts that force the breakdown of fat and glycogen for energy, effectively forcing your body to burn fat without sacrificing muscle mass

Some human studies that have found negligible or negative results of intermittent fasting have certain design flaws, such as subjects being forced to consume a fixed amount of calories instead of following cues of hunger, and using a diet design based on the typical American diet, high in carbs and low in protein and fiber. Fixed calorie counting and the typical American diet's food ratio are inherently counter-effective to IF and therefore yield misleading results

The same genes that promote human longevity also appear to suppress female reproductive capacity. Hence fasting and intense exercise protocols, both known to promote longevity, also lower estrogen levels, thereby modulating body composition in women and suppressing female reproductive capacity

By Dr. Mercola

If you're already off to a good start on a healthy fitness plan, and you're looking for ways to take it to the next level, then you might want to consider intermittent fasting. In essence this fitness-enhancing strategy looks at the timing of meals, as opposed to those fad plans where you eat just one or two things for several days in a row.

On intermittent fasting, the longest time you'll ever abstain from food is 36 hours, although 14-18 hours is more common. You can also opt to simply delay eating. For example, skipping breakfast may be just the thing to get you off a plateau in your fitness routine. The issue of fasting is a major shift from my typical recommendations. I've not been a major advocate for it in the past, but as many of you who have been reading this site for years know, I am always learning.

To that end, I've now revised my personal eating schedule to eliminate breakfast and restrict the time I eat food to a period of about six to seven hours each day, which is typically from noon to 6 or 7 pm.

### Your Ancestors Rarely Had Access to Food 24/7

So it makes sense that our genes are optimized for to this type of feeding schedule. It takes about six to eight hours for your body to metabolize your glycogen stores and after that you actually start to shift to burning fat. However if you are replenishing your glycogen by eating every few hours, you make it far more difficult for your body to actually use your fat stores as fuel.

On the days that I exercise in the morning, I will have two scoops of Pure Power Protein about 30 minutes after the workout to provide nutrients, especially leucine, for muscle growth and repair. Interestingly, since adopting this approach for the past few months I have lost two inches from my waist size and gained three pounds, which means I have lost body fat and gained muscle mass. Just broke 33 inches for my waist and am maintaining my 180 pounds.

A growing body of research suggests that intermittent fasting may in fact be a key weight loss tool. It appears particularly powerful when combined with exercise—i.e. working out while in a fasted state. According to some fitness experts, such as Ori Hofmekler—whose guest commentary is featured below—fasting may indeed push your exercise program to the next level.

It can also boost general health and longevity, but as Ori explains later in this article, there are tradeoffs—you cannot achieve maximum fitness and maximum longevity at the same time. You have to choose one or the other and tailor your diet and fitness regimen to achieve your intended goal. Gender differences also come into play when fasting, which you need to be aware of.

For the last several months I have been experimenting and not eating breakfast and compressing the time that I eat into a 6-7 hour window. I do this nearly every day of the week and it has helped me drop my body fat percentage effortlessly. Interestingly, hunger is not much of a problem as I have shifted to upregulate my fat burning enzymes. I am convinced that having periods of 12-18 hours of fasting is likely highly beneficial. The other variable I am currently in the process of evaluating if dinner would be the better meal to skip. Skipping breakfast is far easier and logistically and socially more acceptable, but avoiding dinner might be better from a health perspective.

### Boost Fitness Results and Weight Loss with Intermittent Fasting

Exercising on an empty stomach has been shown to have a number of health and fitness benefits. It may even be a key to keep your body biologically young. This is most easily accomplished if you exercise first thing in the morning, before breakfast.

Part of the explanation for why exercising while fasted is beneficial is that this regimen complements your sympathetic nervous system (SNS) along with your capacity to burn fat. Your body's fat burning processes are controlled by your SNS, which is activated by exercise and by lack of food. Another reason is that fasting can trigger a dramatic rise in human growth hormone (HGH), also known as "the fitness hormone." Recent research found fasting raised HGH by 1,300 percent in women and 2,000 percent in men!<sup>1</sup>

The combination of fasting and exercising maximizes the impact of cellular factors and catalysts (cyclic AMP and AMP Kinases), which force the breakdown of fat and glycogen for energy.

This is why training on an empty stomach will effectively force your body to burn fat. Exercise and fasting also yield acute oxidative stress, which keeps your muscles' mitochondria, neuro-motors and fibers intact. (You may have heard of oxidative stress before in a negative light, and indeed, when it is chronic it can indeed lead to disease. But acute oxidative stress, such as occurs due to short intense exercise or periodic fasting, actually benefits your muscle.)

Regardless of when you choose to exercise, remember that you need to eat 30 minutes after your workout, which will effectively break your fast. If you exercise in the late morning or early afternoon, you could break your fast by including 20 grams net protein from a fast-assimilating source like a high-quality whey protein concentrate 30 minutes before you start your exercise, and then have another recovery meal 30 minutes after.

### Intermittent Fasting for General Health and Longevity

There's plenty of research showing that fasting has a beneficial impact on longevity in animals. There are a number of mechanisms contributing to this effect. Normalizing insulin sensitivity is a major one as insulin sensitivity is critical for the activation of the mTOR pathway, which along with IGF-1 plays an important part in repairing and regenerating your tissues including your muscles and thereby counteracting the aging process. The fact that it improves a number of potent disease markers also contributes to fasting's overall beneficial effects on general health. For example, modern science has confirmed fasting can help you:

Normalize your insulin sensitivity, which is key for optimal health as insulin resistance (which is what you get when your insulin sensitivity plummets) is a primary contributing factor to nearly all chronic disease, from diabetes to heart disease and even cancer

Normalize ghrelin levels, also known as "the hunger hormone"

Promote human growth hormone (HGH) production, which plays an important part in health, fitness and slowing the aging process

Lower triglyceride levels

Reduce inflammation and lessening free radical damage

While much of the research is profoundly positive, questions have been raised about certain studies where results in human subjects have been less than ideal. Below, fitness expert Ori Hofmekler delves into some of the pitfalls that plague some of the human studies on intermittent fasting, which make the results of such studies unreliable. He also offers a few caveats to successful IF, such as the necessity to avoid the standard American diet when you do eat, as your body requires high quality nutrients when you're doing intermittent fasting. He also reviews some of the gender differences, and why you need to decide on a goal—either maximum fitness, or maximum longevity.

Guest Commentary by Ori Hofmekler

Studies on animals reveal that intermittent fasting (IF) can improve health and extend lifespan similar to calorie restriction. Both regimes have shown to protect against diabetes, cardiovascular disease, neurodegenerative disorders and cancer. Animals on IF have demonstrated some major physiological changes, including:

Decreased plasma insulin

Decreased blood sugar concentrations

D blood pressure

Decreased heart rate

Enhanced immune function

Reduced body fat

Human Trials on Intermittent Fasting

That's how animal respond to a low feeding frequency. But what about humans? Is the human body programmed for a low meal frequency? Only a few experimental studies have tested the effect of intermittent fasting (IF) on humans. Apparently there have been conflicting reports concerning the results.

There were some indications of adaptation issues among subjects who did not become 'habituated' to the low meal frequency – particularly the alternate day fasting. Subjects seemed to feel increased hunger and desire to eat, and a decreased feeling of fullness during these trials.

The one meal per day's results were particularly confusing, as they indicated that though some health improvements were attributed to that regimen, they were only marginal, and they came along with both adverse and beneficial side effects such as increased blood pressure, increased cholesterol (good and bad), decrease in circulating triglycerides, decreased cortisol, and decreased body fat, respectively.

Overall, the findings showed only modest changes in body composition, decreases in some cardiovascular risk factors, and some improvements in cognitive function. These seem like minor benefits compared to the dramatic results shown in animal studies.

Why Do Results from Human IF Trials Differ from Animal Studies?

Though a possible explanation could be that the human response to fasting is different than that of animals, the real reason seems to be in the studies themselves. Apparently, a couple of design flaws have rendered some of these studies unfit for IF trials. Take a look for instance at the initial human study on reduced meal frequency by the American Society for Nutrition – three meals per day versus one meal per day.

That study had two notable flaws:

The subjects on the one meal per day were force-fed a fixed amount of calories, often despite their spontaneous tendency to stop eating due to the feeling of fullness.

The study's diet design was based on the typical American diet's food ratio – high carbs – low protein – low fiber (carbs 50 percent, protein 14.5 percent, fiber 1 percent).

The point is: force feeding and the typical American diet's food ratio are inherently counter-effective to IF and therefore yield misleading results in IF trials. Here is how...

#### Forced Feeding Shatters Your Adaptive Response to Fasting

Fasting has a profound effect on your food cravings as it has shown to shift cravings toward more subtle tasting, nutrient dense, satiety-promoting foods, which can then lead to a spontaneous decrease in your overall calorie intake. This is probably part of an early adaptation mechanism to food scarcity, which encourages intake of maximum nutrients from minimum food.

And when that adaptive response takes place, it transforms your body to become leaner, healthier and increasingly resilient to hunger and fasting. Force-feeding abolishes this adaptive feature.

This means that under the study's terms, the subjects on the one meal per day plan could not possibly adapt to that regimen. However, if they were allowed to choose their foods freely and stop eating upon feeling satiety, they would have probably become increasingly adept to fasting, and the study's results would have been very different. The second flaw in the diet design was that it was based on the typical American diet's food ratio, and that food ratio is counter-effective to IF.

#### The Typical American Diet's Food Ration Negates the Benefits You Get from IF

The typical American diet and its high glycemic food ratio will never complement intermittent fasting, certainly not the one meal per day. Shoving in 40 percent of the daily calories from refined carbs alone in one sitting will affect your insulin and your health more than when that amount is divided into three or several meals.

Yes, if you eat the typical American portions of chocolate, pie, milkshake or ice cream, you'd better cut these into as many meals as possible. And note that the typical American diet with its high carb, low protein, low fiber ratio is known to promote hunger and weight gain; and it certainly lowers your capacity to endure fasting.

So what can you learn from these studies? What should be your right food ratio when following an IF regimen? What should be your right food choices? And what should be your right fuel food?

**Proper Food Ratio:** high protein, low carbs, high fiber. Having a low glycemic food ratio is critical to the viability of your intermittent fasting. Your ideal ratio would be: high protein – low carbs – high fiber. That ratio has proven to be most effective in promoting satiety and resisting hunger. The high protein part serves to nourish and retain your lean tissues whereas the low carb-high fiber ratio helps optimize your insulin and sustain a healthy metabolism. This dietary ratio has also shown to be most effective in decreasing body fat while sparing muscle tissue.

**Proper Food Choices:** Quality protein, green and fibrous vegetables, nutrient dense fruits, good fat. Your protein should come from chemical-free, preferably organic whole food sources – fish, pastured eggs, legumes and dairy. Note that dairy protein, particularly whey, isn't just ok for IF, it actually enhances the benefits you get from fasting via its unique content of immune supportive, anti-inflammatory, and tissue regenerating nutrients which include bioactive peptides, leucine, and calcium.

For fiber and carbs use whole and fibrous plant foods such as greens, cruciferous vegetables, roots, legumes, corn kernels, wild rice, oats and barley.

To support your antioxidant and anti-inflammatory defenses, use nutrient dense fruits such as berries, cherries, citrus, papayas and apples; other powerful options in this category include dark chocolate (no sugar added), green tea and quality non-denatured whey protein. Your fat fuel should come from nuts, seeds, avocados, olives, extra virgin olive oil, coconut oil or whole dairy.

### Fat will Typically Accommodate Your Fasting Better than Carbs

Fat fuel will generally accommodate your fasting better than carb fuel, as it has a longer and more profound effect on your satiety and your ability to sustain energy during fasting. Fat fuel increases ketogenesis – an energy pathway that involves production of ketone bodies, byproducts of fat metabolism – known to serve as your body's preferred fuel during fasting, when glycogen reserves are depleted, and glucose supply is limited.

Ketone bodies have shown to sustain brain and body functions; and incredibly, they have also demonstrated the capacity to protect against neuronal disease, seizures, and age related brain diseases, such as Alzheimer's, Huntington's and Parkinson's. There are however some exceptions to the above.

### Cases where Dietary Fat Should Not Be Your Primary Fuel

Fat should not be your primary fuel if you suffer from a condition of impaired fat metabolism such as:

Hyperlipidemia

Cholesterol disorder

Obesity related insulin resistance

Liver disease

The other reason for not having fat as a primary fuel relates to your type of exercise. If you're a power lifter or engaged in sheer strength training, fat should not be used as your main fuel. Max strength performance requires carbohydrate fuel, as you predominantly use your fast glycolytic fibers (Type IIB white fibers), which are inherently carb dependent and have a very limited capacity to utilize fat.

### Beware of Differences Between Gender, and Individual Health Goals

Gender is another important factor in human and animal studies. Female-specific responses to fasting raise an interesting scientific phenomenon. Researchers have been finding evidence that there is indeed a tradeoff between virility and longevity of organisms.

Apparently the same genes that promote human longevity may trigger biological mechanisms that suppress female reproductive capacity.

Hence, fasting and intense exercise protocols, known to promote longevity, also lower estrogen level and thereby modulate body composition and suppress female reproductive capacity. This is apparently part of an early adaption mechanism to primordial conditions of food scarcity and hardship, which requires increased strength and durability on the account of reproductively. Hence, hard conditions are not biologically suitable times for pregnancy and child bearing.

I discussed this issue with Dr. Marc Mattson, Prof. of Neurosciences at Johns Hopkins University a few years ago. According to Mattson, women who fast or are on calorie restriction, have the tendency to get leaner, become increasingly addicted to physical exercise, and lose their menstrual cycle. Nonetheless, they seem to gain substantial improvements in all main biological markers of longevity – i.e. increased insulin sensitivity, increased GH secretion, improved lipid profile, improved anti-inflammatory cytokine profile, improved cognitive function, etc.

Note that fasting triggers the longevity gene SIRT-1, which regulates mitochondrial energy production along with the gene transcription promoter protein PGC-1 $\alpha$ , which increases mitochondrial biogenesis and density in the muscle. Yes, mitochondrial energy utilization efficiency is a key to longevity.

One of the most notable benefits of fasting is its profound anti-inflammatory effect. Fasting increases production of anti-inflammatory cytokines while suppressing pro-inflammatory cytokines such as TNF- $\alpha$  and IL-6. Note that pro-inflammatory cytokines produced by fat cells (adipokines) are associated with insulin resistance, obesity, metabolic syndrome, and a shorter life span; whereas anti-inflammatory cytokines, such as adiponectin and IL-15, are associated with improved insulin sensitivity, increased thermogenesis, decreased fat storage, increased muscle regeneration and increased life span.

Finally, in view of the current epidemic of excess estrogen in females and males, caused by estrogenic chemicals and foods (such as petrochemicals and soy), fasting and IF can be used as an effective therapeutic strategy to balance estrogen and prevent related metabolic disorders and cancer.

### **Summary Points**

Don't blindly trust human studies on IF as some of these show misleading results due to major design flaws.

Don't even think about intermittent fasting if you eat the typical American portions of high glycemic junk food.

When following an IF regimen you need to make it low glycemic and high in protein and fiber. Eat whole foods, possibly high in dairy and whey protein, along with nutrient dense antioxidant foods.

Adjust your fuel food according to your specific condition and type of training.

Your intermittent fasting regimen must make sense. The length of your fasting intervals should be optimized to yield maximum biological impact. What really counts is your net fasting time (period between meals minus digestion time.) It takes your body roughly 5-8 hours to fully digest a meal and shift into a fasting mode. Three to six hours of "not eating" between meals will not be sufficient to put your body in a fasting mode and therefore will fail to get you the results you're looking for.

The female-specific response to fasting or intermittent fasting is no different than the female response to intense exercise. There is indeed a tradeoff between benefits and side effects. And the question "should women fast" raises the same issues as the question "should women exercise intensely".

### **About the Author**

Ori Hofmekler is the author of *The Warrior Diet*, *The Anti-Estrogenic Diet*, *Maximum Muscle Minimum Fat*, and *Unlock Your Muscle Gene*.

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