

Information about Dietary Fasting

People practice dietary fasting for a variety of reasons, including giving their digestive tracts a rest, striving for weight loss or improved blood fat (such as cholesterol) levels, and as a spiritual discipline. Children, pregnant and breastfeeding women, frail people, and those with certain health conditions (such as diabetes) are advised not to fast. Before beginning dietary fasting, I recommend discussing it with your health care provider to get personalized medical advice about whether it might be right for you.

I conclude from current literature that fasting from, or markedly restricting, food and non-water beverages up to 24 hours at a time is likely not a health risk for a healthy individual who wants to do it. It may be beneficial to one's health and also would likely lead to more free time, since time spent preparing and eating meals, and washing dishes, might be less. I recommend that people who take up dietary fasting be sure to drink plenty of water throughout the day in order to stay fully hydrated. Also, I advise practicing healthful eating on non-fasting days and doing strength training and other physical activities each week, per national recommendations as found online at <http://healthfinder.gov>

Dietary fasting has potential risks, including increased appetite and calorie intake once the fast is over. Poor health effects likely will result from long complete fasts from food and non-water beverages. It can lead to a slower metabolism, whereby the body burns fewer calories, which conserves energy and protects its fat/energy reserves. If the dietary fast is a long one, the body may convert some of its muscle into energy. A smaller muscle mass will cause a long-term slower metabolism, since muscle is metabolically active. After a long fasting period, if appetite and caloric intake are increased while metabolism is slower than before, increases in body weight and body fat would be likely.

Much more research is needed about potential benefits and risks on human health of routine dietary fasting. Below are results regarding dietary fasting, both positive and negative, reported in seven recent articles published in reputable scientific journals. The entries are arranged in reverse chronological order.

September, 2015:

Intermittent fasting is a broad term that includes a variety of programs that manipulate the timing of eating occasions by using short-term fasts in order to improve body composition and overall health. This review examined studies conducted on intermittent fasting programs to determine if they are effective at improving body composition and clinical health markers associated with disease. Intermittent fasting protocols can be grouped into alternate-day fasting, whole-day fasting, and time-restricted feeding.

Alternate-day fasting trials of 3 to 12 weeks in duration appear to be effective at reducing body weight ($\approx 3\%$ – 7%), body fat (≈ 3 – 5.5 kg), total cholesterol ($\approx 10\%$ – 21%), and triglycerides ($\approx 14\%$ – 42%) in normal-weight, overweight, and obese humans.

Whole-day fasting trials lasting 12 to 24 weeks also reduce body weight ($\approx 3\%$ – 9%) and body fat, and favorably improve blood lipids ($\approx 5\%$ – 20% reduction in total cholesterol and $\approx 17\%$ – 50% reduction in triglycerides).

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Research on time-restricted feeding is limited, and clear conclusions cannot be made at present.

Future studies should examine long-term effects of intermittent fasting and the potential synergistic effects of combining intermittent fasting with exercise.

Source: Effects of intermittent fasting on body composition and clinical health markers in humans. Tinsley GM, La Bounty PM. *Nutr Rev* 2015; 73: 661-674.

August 2015:

Clinical research studies of fasting with robust designs and high levels of clinical evidence are sparse in the literature. A systematic review of published literature through January 2015 that evaluated the effects of fasting on clinical event outcomes found 3 randomized controlled clinical trials of fasting in humans. Improvements in weight and other risk-related outcomes were found in the 3 trials. Two observational clinical outcomes studies in humans were found in which fasting was associated with a lower prevalence of heart disease or diagnosed diabetes. No randomized controlled trials of fasting for clinical outcomes were found. Whereas the few studies support the existence of a health benefit from fasting, substantial further research in humans is needed before the use of fasting as a health intervention can be recommended.

Source: Health effects of intermittent fasting: hormesis or harm? A systematic review. Horne BD, Muhlestein JB, Anderson JL. *Am J Clin Nutr* August 2015; 102(2): 464-470.

April 2015:

Because caloric restriction is not sustainable long term for most humans, we investigated an alternative approach, intermittent fasting (IF), which is proposed to act on similar biological pathways. We studied a modified IF diet, where participants maintained overall energy balance by alternating between a day of fasting (25% of normal caloric intake) and a day of feasting (175% of normal). We recruited 24 healthy individuals in a double-crossover, double-blinded, randomized clinical trial. Participants underwent two 3-week treatment periods: IF and IF with anti-oxidant (vitamins C and E) supplementation.

We found excellent adherence to our study-provided diets: participants found the diet tolerable, with no adverse clinical findings or weight change.

We detected a marginal increase (2.7%) in SIRT3 expression, which may protect against oxidative stress, due to the IF diet, but no change in expression of other genes or oxidative stress markers analyzed. [Mary's note: Seven sirtuins have been identified in humans, and of these, three sirtuin proteins, SIRT3, SIRT4, and SIRT5, modify mitochondrial proteins and are thought to regulate mitochondrial, or energy, metabolic pathways.]

We also found that IF decreased plasma insulin levels (1.01 μ U/mL).

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Source: Practicality of intermittent fasting in humans and its effect on oxidative stress and genes related to aging and metabolism. Wegman MP1, Guo MH, Bennion DM, Shankar MN, Chrzanowski SM, Goldberg LA, Xu J, Williams TA, Lu X, Hsu SI, Anton SD, Leeuwenburgh C, Brantly ML. *Rejuvenation Res.* 2015 Apr; 18(2): 162-172.

June 2014:

Calorie reduction lowers body temperature, rate of metabolism and oxidant production. It is a well-recognized phenomenon that scarcity of food ubiquitously leads to a hypo-metabolic state, whereby body temperature and metabolic rate are depressed.

Source: Caloric Restriction and the Aging Process: A Critique. Sohail RS, Forster MJ. *Free Radic Biol Med.* 2014 Aug; 0: 366–382.

October 2013:

Long-term compliance to conventional weight loss programs is poor, possibly due to internal feedback systems that defend against body weight change by signaling the body to increase food intake and decrease energy expenditure in response to caloric restriction. Can long-term compliance be improved through a novel behavioral approach, intermittent fasting?

With intermittent fasting, in contrast to traditional caloric restriction paradigms, food is not consumed during designated fasting time periods but is typically not restricted during designated feeding time periods. The length of the fasting time period can vary. Literature suggests that fasting periods and intermittent fasting regimens can result in a host of beneficial biological effects, including increased circulation and cardiovascular disease protection, and modulation of reactive oxygen species and inflammatory cytokines. Periods of fasting have also been shown to have anti-mutagenic, anti-bacterial, and anti-cancer effects.

Future research should explore the potential benefits of intermittent fasting approaches in humans, while also assessing the potential risks that may be associated with the increased caloric intake that typically occurs during non-fasting time periods.

Source: Fasting or caloric restriction for healthy aging. Anton S, Leeuwenburgh C. *Exp Gerontol.* 2013 Oct; 48(10): 1003–1005.

October 2013:

Even a brief period of food restriction may predispose individuals to desire more calorically-dense foods.

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Research has shown how a pattern of overeating coupled with periods of food restriction may alter neural mechanisms that underlie reward, potentially increasing the pleasure derived from food consumption and perhaps making it more difficult to resist.

Source: Avena NM, Murray S, Gold MS. Comparing the effects of food restriction and overeating on brain reward systems. *Exp. Gerontol.* 2013 Oct; 48(10): 1062–1067.

March 2013:

Animals subjected to intermittent fasting have shown positive changes in glucose (lower plasma glucose and insulin levels) and in lipid metabolism (reduced visceral fat tissue and increased plasma adiponectin level), and an increased resistance to stress.

In addition, although there are a limited number of studies, positive results have been reported for human health: improved lipid profile; decreased inflammatory responses, reflected by changes in serum adipokine levels; and changed expression of genes related to inflammatory response and other factors. Studies on obese individuals have shown that compliance was greater for intermittent fasting than traditional calorie restriction, and intermittent fasting was associated with low oxidative stress. Intermittent fasting may exert a positive impact on the metabolic disorders commonly associated with cardiovascular diseases, and may be a viable and accessible intervention for most individuals.

Source: Effects of intermittent fasting on metabolism in men. Azevedo FR, Ikeoka D, Caramelli B. *Rev Assoc Med Bras.* 2013 Mar-Apr; 59(2): 167-73.

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