

TRE AND MUSCLE HEALTH

CAN YOU PRACTICE TIME-RESTRICTED EATING WITHOUT LOSING MUSCLE MASS AND STRENGTH?

Eating within a limited time frame has been shown to have a number of physiological benefits, but its defining characteristic goes against recommendations for optimal protein intake and muscle health. Strength coach *Tony Boutagy* looks at whether it's possible to successfully combine both strategies.



While enjoying breakfast with some fellow presenters at a conference in New Zealand back in 2002, I was asked by someone who was having just a black coffee for 'breakfast' as to my thoughts on the 'Warrior Diet'. To my shame, I hadn't heard about this approach to eating. It was quickly explained to me that it was based on the practice of ancient warriors who would eat little to nothing during the day, and then consume one large meal at night. The creator of the diet, Ori Hofmekler, popularised what would be known a decade later as 'time-restricted feeding', and several years after that as 'time-restricted eating' (TRE), as the early studies were conducted on animals (which are fed) and the subsequent ones on humans (who eat).

TRE falls under the banner of dietary approaches that do not seek to change what people eat, but rather when they eat it. It is often loosely viewed as one of the several strategies known as intermittent fasting, which includes the 5:2 diet, alternate day fasting, the fasting mimicking diet, the one-meal-a-day diet and true extended water only fasting.

What does intermittent fasting achieve?

Two decades of research on intermittent fasting has shown broad-spectrum benefits for many health conditions, such as obesity, diabetes mellitus, cardiovascular disease, cancers and neurologic disorders. One of the primary explanations for the health promoting benefits of intermittent fasting is the switching of fuel substrates, from glucose to fatty acid derived ketone bodies. This change in fuel source is referred to as 'flipping of the metabolic switch' and research has shown that it not only provides the ketones that are necessary to fuel cells during the fasting period, but also creates a highly orchestrated total body response that carries over into the fed state to increase mental and physical performance, as well as disease resistance.

In 2012, Satchidananda Panda, from the Salk Institute in California, began the modern era of investigations into time-restricted feeding by examining compressed feeding windows in mice. Mice, of course, are nocturnal, so a lab assistant needed to be there late in the evening and early in the morning to administer the 'breakfast' and 'dinner'. Due to family work-life pressures, they settled on an 8-hour feeding window and a 16-hour fasting period to use as the experimental model - and that is how the popular 16/8 came about.



THE QUICK READ

- Research indicates that time restricted-eating (TRE) can reduce blood glucose levels, improve insulin sensitivity, deplete glycogen stores, decrease oxidative stress and inflammation, lower blood pressure and improve sleep
- Data indicate a compressed eating window of between 6 to 8 hours can significantly improve health
- TRE aligns the supply of food with the time period during the day in which the body is best able to receive and use it
- Studies suggest that the physiologically ideal time for food consumption could be in the earlier hours of the day and in close proximity to exercise sessions
- TRE alters the pattern and frequency of protein ingestion in a manner that is not consistent with the current recommendations for protein intake and muscle health
- Studies have indicated that in order to prevent a reduction in muscle tissue, TRE requires adequate energy and protein intake to be combined with resistance training.

The benefits of TRE

All of the early knowledge on the benefits of TRE was derived from animal studies, which makes the extrapolation of recommendations to humans tenuous. However, the last several years have seen a number of trials conducted on a range of human subjects, including obese, normal weight and athletic males and females, allowing us to feel far more confident in our understanding of the benefits of this dietary approach.

Studies have shown that time-restricted eating can promote weight loss as well as health benefits independent of the reduction in body weight. Research indicates that TRE can reduce blood glucose levels, improve insulin sensitivity, deplete glycogen stores - which results in the elevation in circulating ketones - decrease systemic oxidative stress and inflammation, lower blood pressure and improve sleep patterns.

The ideal ratio

The ideal eating-to-fasting ratio is not currently known, but the totality of the data indicate a compressed eating window of between 6 to 8 hours (fasting 16 to 18 hours) can result in significant improvements to health outcomes. Interestingly, more time spent fasting is not necessarily better, with one study finding that reducing the feeding window to less than 6 hours did not confer additional benefits: obese adults implementing 4 hours (3–7pm) or 6 hours (1–7pm) of time-restricted eating for 8-weeks showed comparable reductions in body weight, caloric intake, oxidative stress, and improvements in insulin sensitivity.

In rhythm with the body

Time-restricted eating typically aims to align the feeding-fasting cycle with the light-dark periods of our circadian rhythms. This synchronises the supply of food with the time period during the day in which the body is best able to receive and use it.

Researchers have long noted a condition known as ‘evening diabetes’, where evening meals result in greater glucose and insulin spikes compared to the equivalent meal consumed in the morning. These findings have also been confirmed in other research to include poorer triglyceride control and weight regulation with late night eating. One study found that adults who consumed the majority of their calories in the morning showed more significant weight loss and decreases in waist circumference than those who consumed an equivalent amount of calories in the evening,

Studies suggest that time-restricted eating causes positive effects on cardiometabolic parameters, particularly when food consumption occurs early in the day and in proximity to exercise and the active phases of the day.

It has been well noted that most of our modern society has almost uninterrupted access to food, especially products with high energy density and low nutritional quality, which has been shown to have negative health outcomes, especially with regards body weight and metabolic disease. The compressed eating window seen in TRE protocols causes a reduction in access to unrestrained food consumption, especially late night snacking.

From an evolutionary perspective, humans were highly active during the day and inactive overnight. In line with this, it appears that our circadian system has developed to ensure that physiological processes are most active during the day and conserved while we sleep. However, modern culture encourages behaviours that strongly contribute to circadian disruption, owing largely to artificial lighting, social jetlag, shift work, eating jet lag (variability in the timing of food intake), as well as the nearly uninterrupted access to food. All of this amounts to the development of numerous adverse health conditions.

In an attempt to investigate the effects of aligning food intake to the time of the day where we are most active, Elizabeth Sutton and her co-workers (2018) examined a specific type of time-restricted eating called early time-restricted eating (eTRE), in which feeding occurs early in the day to be optimally aligned with our biological circadian rhythms. The researchers showed that eTRE with a 6-hour eating period (8am to 2pm) for a duration of five weeks showed improvements in insulin sensitivity and greater beta-pancreatic cells responsiveness, as well as important reductions in blood pressure levels, oxidative stress markers and hunger perception at night, compared to the control condition (eating period of 12 hours; 8am to 8pm).



A potential concern of time-restricted eating is the potential to impair muscle mass and strength



These findings, combined with those from similar eTRE studies, suggest that the physiologically ideal time for food consumption could be in the earlier hours of the day and in close proximity to exercise sessions, which promote alignment of the feeding-fasting cycle with the circadian rhythms of human metabolism, resulting in improvement to our cardiometabolic health.

Potential downside to muscle mass?

Maintaining muscle mass and strength as we age is a priority, as muscle and strength trend downwards after the age of 50 by approximately 1% and 3% a year, respectively. It is well known that increased dietary protein intake in conjunction with resistance training halts the loss of muscle tissue and strength as we age and during periods of caloric restriction.

Several investigations indicate that dietary protein should be evenly distributed throughout the day to maximise its anabolic effect on muscle tissue. Numerous studies have shown that following consumption of a meal containing protein, serum concentrations of amino acids and muscle protein synthesis rates will be increased and remain elevated for three to five hours after the meal. Owing to the rise in muscle protein synthesis after a meal, it has been demonstrated that protein intakes spaced by approximately three to four hours throughout the day lead to more favourable changes in whole-body muscle protein synthesis, compared to less frequent ingestion. TRE alters the pattern and frequency of protein ingestion in a manner that is not consistent with these current recommendations for protein intake and muscle health. Therefore, based on these considerations, a potential concern of time-restricted eating is the potential to impair muscle mass and strength.

It has been previously noted that muscle mass contributes approximately 30% of total body weight loss in participants who are in energy restriction. In theory, less frequent feeding occasions and prolonged fasting periods could contribute to greater muscle loss with time-restricted eating. To date, only eleven studies conducted on TRE have presented data on muscle mass. Three reported a reduction, seven showed no change and one found an increase in muscle mass (and that study used resistance training.)

Six studies have examined the effect of time-restricted eating on muscle strength and power using handgrip, vertical jump, bench press, leg press and leg extension tests for assessing one repetition maximum and repetitions to failure at 65-70% of 1-RM. It was found that time-restricted eating had either no effect on these performance indices or these indices improved similarly between time-restricted eating and the free eating controls.

As noted, one study found an increase in muscle mass during time-restricted eating when resistance training was performed. The investigations using strength training, now totalling four studies, have been conducted by Grant Tinsley and his colleagues. They have sought to evaluate the effects of time-restricted eating in combination with resistance training on health parameters, body composition and muscle mass. The first study, which was conducted on trained male participants, used an 8-week strength training program and a TRE pattern of an 8-hour eating period (12pm to 8pm). The researchers found a significant reduction in fat mass and a preservation of muscle mass compared to the 12-hour feeding group (8am to 8pm).



Similarly, Tinsley et al. (2019) reported no reduction of muscle mass or maximal strength in active females performing eight weeks of TRE (12pm to 8pm) while performing progressive resistance training, compared to a control group with an eating window of approximately 13-hours.

In another investigation, Tinsley et al. (2017) examined the effects of 8-weeks of resistance training in trained men, with TRE performed only on days without strength training and the eating period being a more intense 4 hours in the day. Compared to the group with unrestricted time to eat, no significant differences were found in weight and body composition, highlighting the important role resistance training plays in preserving muscle tissue in the absence of nutrition.

In all of the other Tinsley studies, daily TRE with an eating window of approximately 8 hours was employed. The findings have demonstrated equivalent muscle mass changes in TRE and control groups when both groups consumed 1.6 to 1.9 grams per kg of body mass per day of protein and similar total energy.

Taken as a whole, the studies from Grant Tinsley and co-workers strongly indicate that time-restricted eating requires resistance training in combination with adequate energy and protein intake to prevent a reduction in muscle tissue. Tinsley has noted that although the pattern and frequency of protein ingestion is important in certain contexts, the overall daily intake of protein and resistance training must be considered as the primary factors for increasing or maintaining muscle mass.

Summary

Time-restricted eating seeks to align our eating patterns with the time of day when we are most active. Studies suggest that shifting our eating periods to earlier in the day and in proximity to our exercise sessions is a strategy better matched to our evolutionary circadian biology and can improve many markers of health. To help preserve or even build muscle mass during time-restricted eating, a daily protein intake of 1.6 to 1.9g per kilogram of body mass is recommended in combination with resistance training. **N**

For references read this article at [fitnessnetwork.com.au](https://www.fitnessnetwork.com.au)



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