



THE ENERGY BLUEPRINT



# Energy Flux and Energy Flux Exercise

Body composition and weight are the sum of countless factors that regulate and influence the “intake” and “expenditure” sides of the energy balance equation. Although we all know that diet and exercise are key players in energy balance, many don’t fully understand how they are physiologically linked and that their impact on body weight is highly interrelated.

You’ve probably heard the saying *eat less, move more*. While too simplistic to capture the many nuances of fat loss, it does capture the essence of what must occur in order to lose weight: **chronically increase your energy expenditure above your energy intake.**

Unfortunately, eating less food can be hard, especially if you are already working with a small calorie budget due to being small or inactive. Plus, eating less food means that you run a greater risk of not getting all the nutrients you need to be healthy and energized.

Plus, fat loss is no longer a ‘diet vs. exercise’ or ‘diet and exercise’ issue, but an understanding of the synergy and interrelated nature of these two factors.

Let’s change the saying, shall we? How about ***eat more, move more***.



This is the basis of *energy flux*, which is basically the sum of the energy we burn through on a daily basis, plus the energy we get from food.

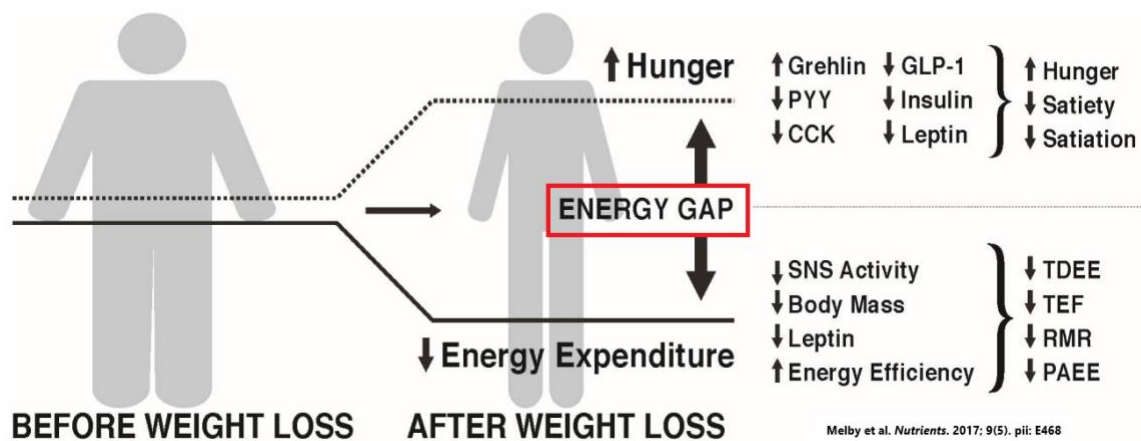
To maximize our fat loss efforts, we need to focus on having a high energy flux, meaning that we want to be burning a lot of energy while also eating a lot of food. Consider these scenarios:

- 3,000 calories out – 2,500 calories in = 500 calorie deficit
- 2,000 calories out – 1,500 calories in = 500 calorie deficit

Both scenarios have the same daily energy deficit of 500 calories, but the first scenario has a way higher energy flux (5,500 vs 3,500 calories). As we'll see, eating more and moving more to create more energy flux has many advantages for getting us a lean physique and making the journey more enjoyable.

## The Energy Gap

Maintaining a high energy flux does wonders for weight loss primarily because it addresses the [energy gap problem](#), which is the **discordance between the reduction in energy expenditure and increase in hunger that results from dieting**.



Basically, when you lose weight, changes in hormonal concentrations, gut peptides, body weight, nervous system activity, and energetic efficiency create a situation where hunger increases and energy expenditure decreases to promote weight regain.

## Energy Expenditure

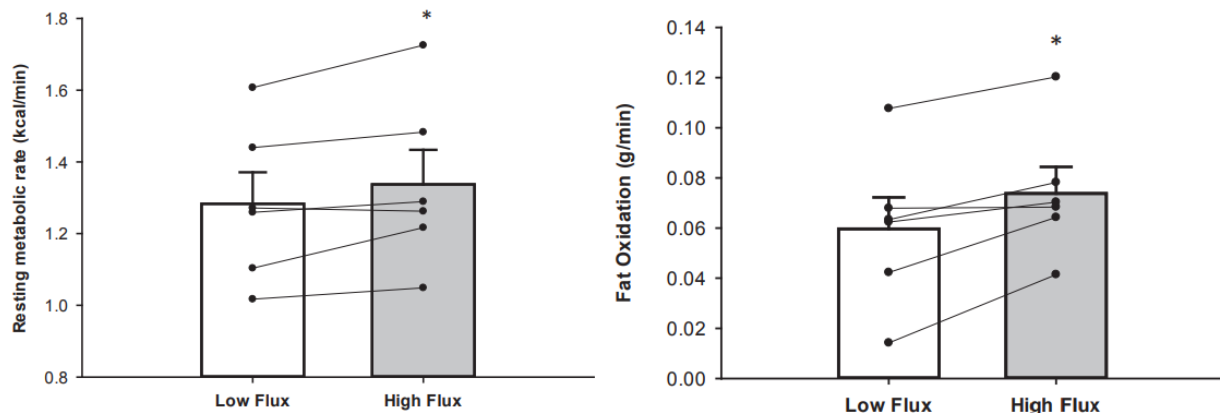
Our daily energy expenditure is made up by several things; the one that plays the largest role is our *resting energy expenditure* (RMR), which is the amount of calories we burn if we were to just lie in bed all day. It's the amount of energy our body needs to simply keep us alive.

When we diet, our body tries to conserve as much energy as it can. One of the ways it does this is through slowing down processes that aren't necessary for survival and require a lot of energy to sustain, such as protein synthesis. This presents as a decline in RMR, which is completely normal, but means that we aren't losing as much fat since our energy expenditure declines.

**Several studies have shown that increasing energy flux can help prevent the decline in RMR that results from metabolic adaptations in response to dieting.**

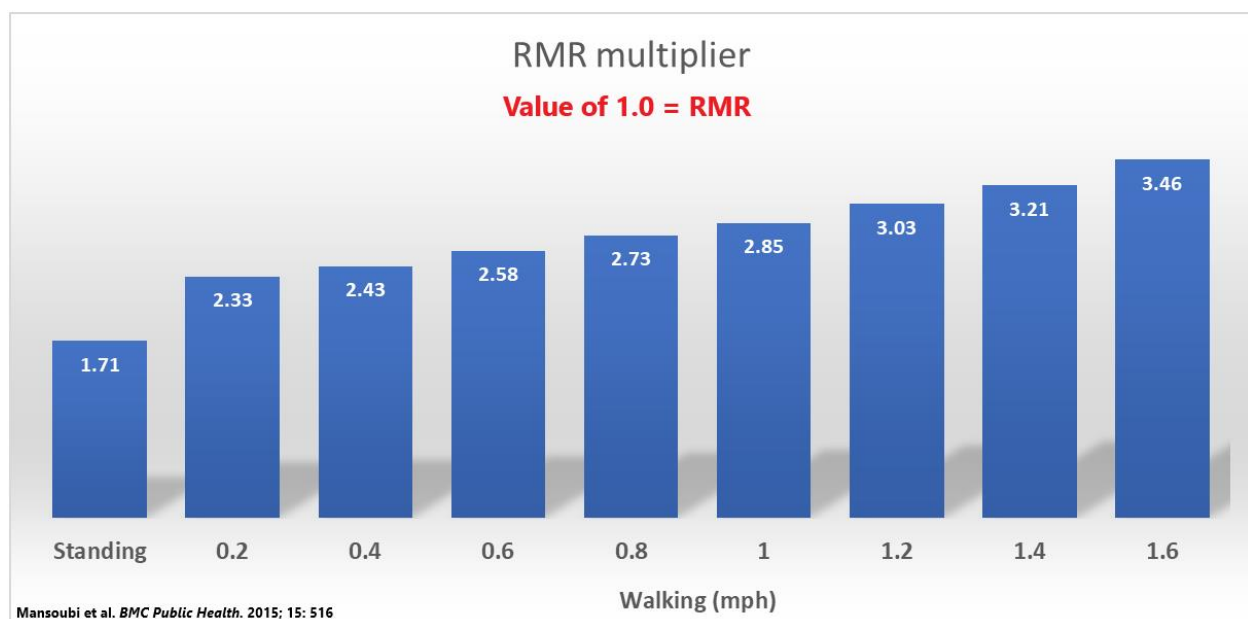
For example, in one study, obese adults lost 7% of their body weight over several months and then spent 3 weeks staying at their reduced body weight while in either a high- or low-flux state. Both states were the same except that the high-flux condition had the participants burn an extra 500 calories each day through exercise while also eating an extra 500 calories to make up for it. **Not only was RMR greater in the high-flux condition, fat oxidation was greater and hunger was lower.**

### Maintaining a high energy flux increases resting metabolic rate and fat oxidation



Paris et al. *Clin Nutr ESPEN*. 2016; 11: e12-e20.

Maintaining a higher energy flux also demands that we are more active throughout the day, and that helps close the energy gap through simply increasing energy expenditure. You needn't get on a treadmill and slave away with dedicated exercise, either. One of the best ways to increase physical activity energy expenditure is through being [more active in your leisure time](#) (called non-exercise activity thermogenesis, or NEAT). This type of activity [has been called](#) *"the crouching tiger hidden dragon of societal weight gain"* because it is so pivotal to weight loss.



Mansoubi et al. *BMC Public Health*. 2015; 15: 516

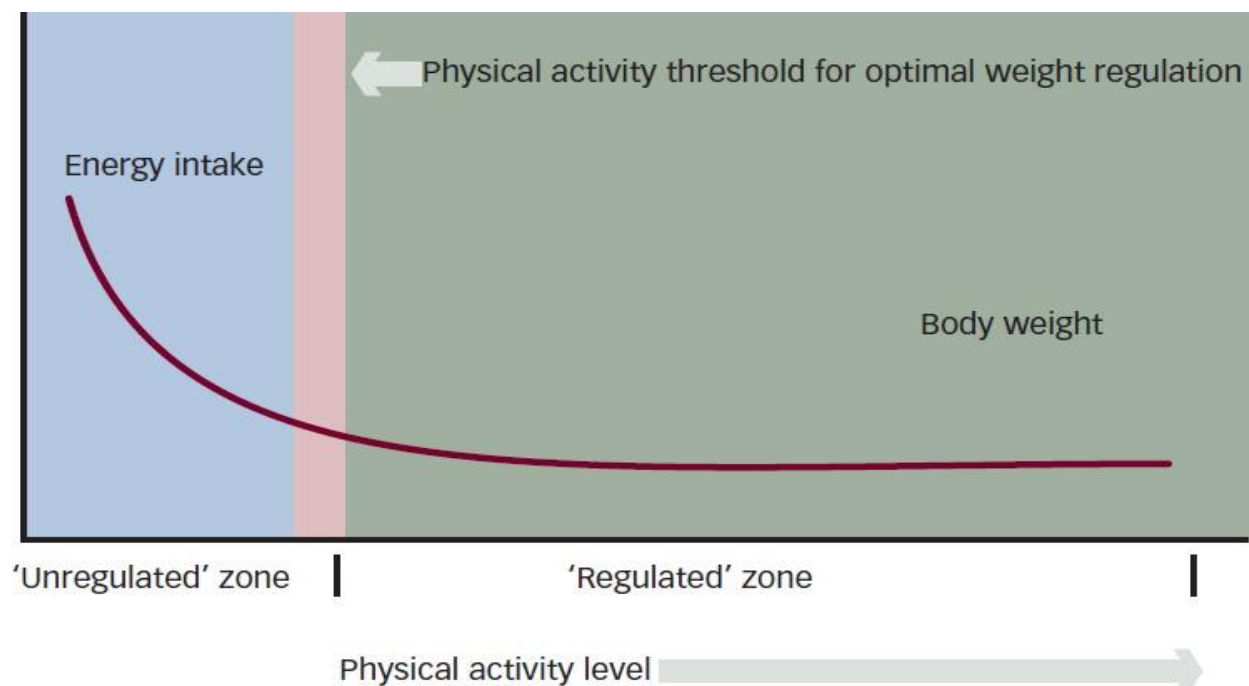


For example, [one study](#) calculated that if someone with obesity were as leisurely active as the average normal-weight person, they would burn an extra 350 calories per day from all the extra small activities that add up throughout the day. Even just standing [burns 1.7 times](#) as many calories than if you were laying around all day.

## Appetite Regulation

Perhaps the most important way that having a high energy flux benefits fat loss is by helping with appetite. **We've known [since at least 1956](#) that people who are more active have an appetite better coupled to their requirements** — sedentary workers eat more food than their body needs while workers with physically demanding jobs ate an appropriate amount of food.

People's appetite was linked to their needs only as energy flux increased after a certain point. Below this threshold, in what was termed the *"unregulated zone"*, food intake increased as energy expenditure decreased.



**Appetite is better regulated with a high energy flux!**

This is probably because regular exercise heightens the brain's sensitivity to leptin and insulin, two powerful satiety hormones, and enhance satiety signals coming from the gut.

We have a lot of data showing that regular physical activity, thereby contributing to a higher energy flux, helps slash hunger and promote fat loss.

- In one study, researchers locked some men in a metabolic ward for one week and had them exercise or remain sedentary with unlimited access to food. A metabolic ward is really cool because it allows the researchers to have complete control over the participants lives. It's like a studio apartment set up to precisely measure every anything the researchers are interested in.

In this case, the researchers precisely measured everything that each of the men ate, and they found that they ate the same amount of calories when active and when sedentary — despite burning 30% less calories when sedentary! The men actually had greater preoccupation with thoughts of food and urges to eat when sedentary.

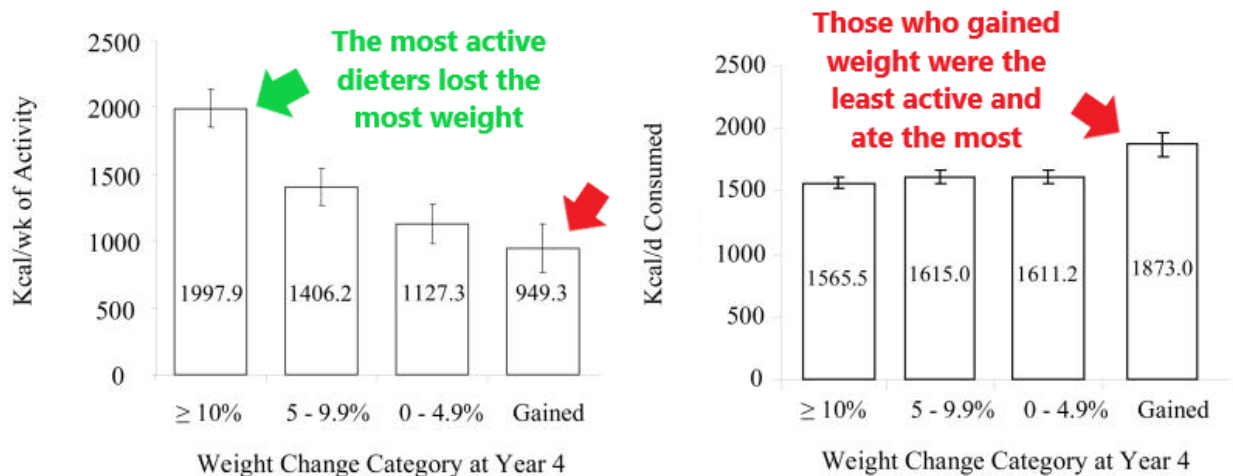
- In another study, some college guys completed three test sessions where they remained sedentary all day, went for a 25-minute walk 7 times per day, or went for a 25-minute jog 7 times per day, culminating in a delicious dinner buffet that the researchers used to determine the effects of these different activity levels on food intake.

Just like with the last study, there was no difference in how much food the men ate regardless of how much activity they performed earlier in the day, meaning that being sedentary led to overeating relative to energy

requirements.

- Other research has followed groups of people for years and observed how their weight relates to their activity levels. [One of these studies](#) found that people with low levels of physical activity experienced the largest gains in fat mass of all individuals over 1 year, resulting in a 2- to 4-fold higher risk of gaining clinically significant amounts of fat mass.

[Another of these studies](#) followed people participating in a weight loss intervention for 4 years. The most successful dieters were those who were the most active, while the least successful were the least active and ate the most food.



Wadden et al. *Obesity (Silver Spring)*. 2011; 19(10): 1987-98

Overall, it shouldn't be any surprise that the people who are best able to maintain significant amounts of weight loss do so by [maintaining a higher energy flux](#).

Basically, maintaining a high energy flux is key to successful fat loss and fat loss maintenance in [three ways](#):

1. Maintains overall higher energy expenditure by maintaining muscle mass, thermic effect of food, and a higher RMR. A person in high energy flux will expend more energy in PA and need to eat more food to cover their energy



needs.

2. Heightens sensitivity to appetite control through its impact on appetite-regulatory hormones and food preferences. Thus, the desire to over-consume food is dampened and the total energy intake modified.
3. Allows for more appropriate energy intake or volume of food consumed, thus, reducing the probability of overeating. Sedentary individuals (e.g., in low energy flux) can have daily energy needs that are so low that it is easy to consume more food (e.g., calories) than needed in our current obesogenic environment.

As a [group of researchers](#) from the Nutrition and Metabolic Fitness Laboratory of Colorado State University sum this all up nicely:

*“One promising approach to tackle the elevated hunger and reduced energy expenditure that occur with weight loss is the establishment of a high energy flux state in which a high throughput of calories occurs, owing to high daily energy expenditure and matching energy intake... energy intake may be more accurately regulated to match energy expenditure in a high flux state.”*

## Summary

Energy flux is basically the sum or how much we burn plus how much we eat. If we are aiming for a 500 calorie deficit each day, it's better to burn 3,000 and eat 2,500 than it is to burn 2,000 and eat 1,500.

Maintaining a higher energy flux helps offset the metabolic adaptations that accompany dieting, such a reduction in resting energy expenditure. It also helps

squash appetite and close the energy gap that forms with fat loss, where our hunger outpaces our energy requirements.

The best way to increase our energy flux is to not exercise more, but to be more leisurely active instead. That means taking the stairs, going for walking breaks at work, and trying to not spend a lot of time just sitting around.

# Exercise

There's a lot of conflicting advice out there when it comes to exercise and fat loss.

- You have the people who promote the idea that doing cardio and getting into your “fat burning zone” is the best approach.
- Others who say that high-intensity intervals training (HIIT) is the most effective approach.
- Others who say that weight training (resistance training) is the best.
- And even people who claim that exercise is a big waste of time because it increases hunger and isn't an efficient way to burn calories.

So, what's the verdict?

Read on to get an overview of the most effective types of exercise for fat loss and body re-composition.

# Diet, Exercise, Or Diet With Exercise?



The big thing we need to understand before we start talking about exercise for fat loss is that it cannot replace diet. You can't ignore what you eat and expect to lose fat simply because you exercise for hours each day. That's not only suboptimal,

it's not sustainable.

At the same time, you can't expect the best results by just dieting and sitting on your butt all day.

We need both diet and exercise to maximize fat loss. Why? **Because it provides a beneficial hormetic stress on the body that facilitates muscle growth and fat loss.**

We can thank the mathematician James Clark from Manchester Community College for showing this when, back in 2015, he [crunched the numbers](#) on 66 studies that compared how diet or diet plus some type of exercise affect body composition.

He found that changes in body composition didn't correlate very well with the calorie deficit created by an intervention. That is, if calories were all that mattered, then we should expect similar fat loss regardless of how the calorie deficit was created. But that's not the case.

Rather, **the effectiveness of an intervention was related to the metabolic demand it placed on the body.** It makes sense considering the complexity of the body and the variety of interconnected factors at play beyond the simplistic caloric balance. Here is Clark's words:

*"While popular ideas suggest the necessity for acute energetic imbalance, there appears to be no relationship between any treatments effectiveness for inducing acute changes in energetic balance with the effectiveness for induced responses to body composition or biomarkers of health from said treatment program. All of which reinforces the idea of a more complex network of factors that influence overall body composition and health issues for the adult who is overfat, and further stresses the idea to focus treatment on generating a metabolic stress to induce chronic [hormonal] changes as opposed to the focus on the [calorie] ratios of intake to expenditure."*

This helps explain why simple forced calorie restriction and fasting approaches to fat loss have such abysmal success rates. Just starving your body of calories does not work very well in the long run. In fact, it works pretty terribly. What does work is putting metabolic stress on the body.

# Resistance Training The Best Type Of Exercise For Fat Loss

So, what was the best type of exercise and metabolic stress?

According to [Clark's analysis](#), **resistance training was the best at reducing fat mass while maintaining or increasing muscle mass.**



We can see this in direct head-to-head studies comparing cardio to resistance training:

- For instance, in [one study](#) comparing overweight dieters who dieted without exercise, dieted while doing cardio, or dieted while doing cardio plus resistance training, **all groups lost 9 to 10 kg (20 to 22 lbs) of body weight, but only the resistance training group had all of this weight loss come from their body fat.** The other two groups lost muscle alongside it, which also means they lost less fat mass.
- In [another study](#), dieting while performing cardio for an hour per day on 4 days per week led to more weight loss than dieting while resistance training on 3 days per week, but **the extra weight loss came entirely from a loss of muscle mass — fat loss was the same!** Resistance training also led to an increase in metabolic rate, whereas cardio decreased it.

Also, [some studies](#) suggest that the contractions of our muscles, such as during resistance training, leads to the release signaling proteins that alter the type of fat on our body, turning it into a type of “beige” fat that actually burns calories.

Finally, Clark’s analysis found that **resistance training became more effective at higher intensities**. That means performing at least 3 sets working in the 5- to 10-repetition range.

**Optimal fat loss requires that we diet and exercise, ideally through lifting heavy things via resistance training.**

It’s a type of exercise that has [existed in many forms](#):



As early as 480 BC Greek soldiers engaged in calisthenics, using their bodyweight to provide resistance during exercise

Free weights like barbells and dumbbells were popularized by the Milo Barbell company in the early 1900s, providing a means to easily lift progressively heavier weights as strength increased



Resistance training machines came about around the same time and are commonplace in most gyms and fitness centers alongside free weights

- As early as 480 BC Greek soldiers engaged in calisthenics, using their bodyweight to provide resistance during exercise. We still see heavy use of calisthenics today in gymnastics and related sports.
- Free weights like barbells and dumbbells were popularized by the Milo Barbell company in the early 1900s, providing a means to easily lift progressively heavier weights as strength increased.
- Resistance training machines came about around the same time and are commonplace in most gyms and fitness centers alongside free weights.



Regardless of the type of resistance training, the key theme that differentiates it from other forms of exercise is that **it involves repeated muscular contractions against some form of resistance, at a relatively high effort, for a relatively brief duration, and relatively infrequently.**

When it comes to body composition, the type of lifts you perform don't seem to matter as much as the total volume you are lifting. However, opting for compound movements like squats and deadlifts is [superior](#) to sticking with isolation exercise like leg extensions and curls for increasing muscular strength and overall fitness.

[Multiple studies have found](#) no additional benefit to body composition or fitness from adding isolation work to a routine containing sufficient compound exercise work.

## The Next Best Option Is HIIT

If you opt for some form of cardio, either alongside resistance training or instead of it, then you are best served by doing some *high-intensity interval training* (HIIT). The reason is twofold:



- HIIT is better than traditional cardio for [improving cardiorespiratory fitness](#), and
- HIIT [takes a fraction of the time](#) that traditional cardio demands. Which would you prefer, doing some sprint intervals for 15 minutes, or slaving away on the treadmill for an hour?

This latter point is really worth emphasizing. When the warm-up and cool-down are included in the HIIT protocol, it requires [40% less time](#) to elicit the same amount of fat loss as traditional steady-state cardio. However, the more intense you can perform your sprints, [the more fat you'll lose](#).

But remember: HIIT isn't called high-intensity interval training for nothing. It's tough. That might be an understatement. Most people do not do HIIT regularly because it is so damn hard.

But that difficulty is why it's so much more beneficial than steady-state cardio. Remember what Clark found: **the effectiveness of an intervention is related to the metabolic demand it placed on the body**. Sprints are demanding.

Now, if you opt to combine HIIT with resistance training, well that's another reason to opt for HIIT over steady-state. **High volume, moderate-intensity, continuous endurance training [interferes with](#) resistance training-induced adaptations while short bouts of HIIT don't.**

When the goal is to [maximize resistance training adaptations and improve body composition](#):

1. Opt for HIIT over steady-state.
2. Choose cycling over other types of endurance training (running, elliptical, etc.)

3. Perform your resistance training session before cardio if done on the same day, and separate them by 3–6 hours. Otherwise, do them on different days.
4. Use a ratio of 2:1 or 3:1 between resistance training sessions per week and HIIT sessions per week. So, if you lift 3–4 days per week, then do HIIT 1–2 times per week.
5. If you're just getting started, just do resistance training or HIIT, not both. The benefits of combining them are more pronounced in people who have more training experience.

## Some Exercise Is Better Than No Exercise

If your regularly sedentary, it likely doesn't matter very much what type of exercise you start doing — anything will work.

Pretty much all types of exercise will result in large benefits. And there won't be large differences between exercise types in terms of fat loss. The fitter you get, the leaner you get, and the healthier you become, the more that exercise type begins to matter more for changing your body.

But even then, regardless of what is theoretically best for fat loss, if you don't stick with the exercise routine, you won't benefit. So, **you need to decide on a type of exercise that you love doing for its own sake — something you can do for the rest of your life.**

If you don't follow this advice, then nothing else matters, because even if you do some exercise routine for 60 days or 90 days, if you then stop doing that routine

because you don't like it, you will slowly lose all of the results you got. So, find a type of exercise that you love (or at least like) and can continue to do for life.

Ideally, that would be resistance training or high-intensity interval training (HIIT). But if you love going for gentle walks, bike rides, or dancing, then realize that consistently doing something — even if it's not optimal — is much better than not doing anything.

**As with nutrition and every other lifestyle change, the only exercise changes that matter in the long run are those you can sustain for life.**

# Some Fasted Training Is Worth It

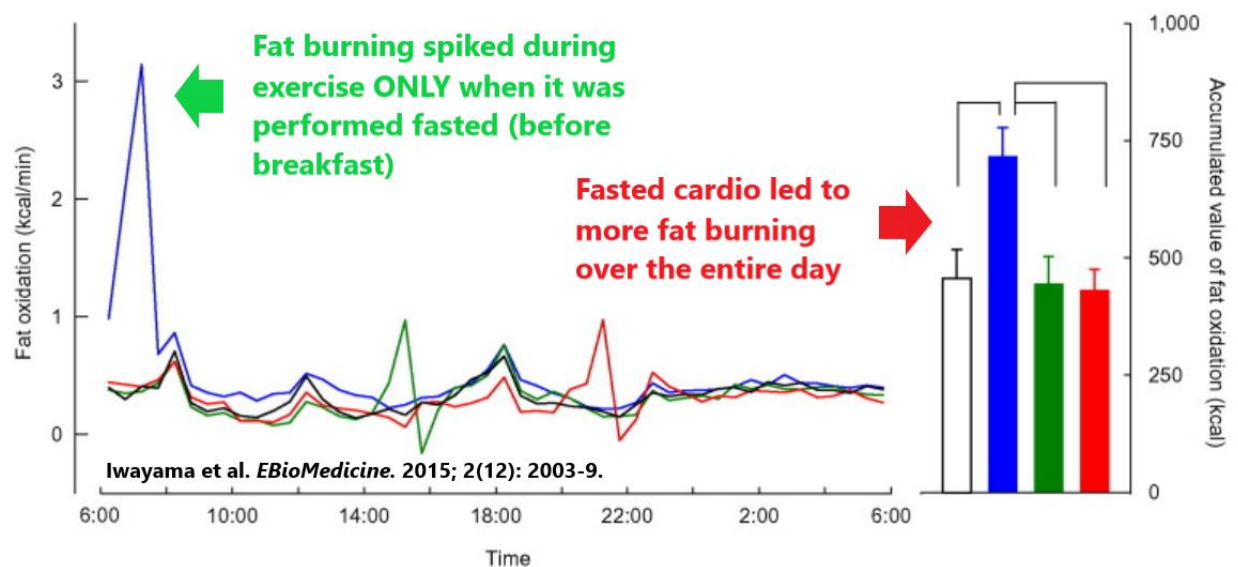
We definitely want to incorporate some fasted training into our routine if we are going to maximize fat loss. It's as simple as exercising in the morning after a normal overnight fast, before you eat breakfast.

Why? Because your body doesn't have as much carbohydrates or glycogen (our storage form of carbs) to rely on, forcing it to dig deep into our fat reserves to fuel our activity. This is the basis of metabolic flexibility. Our body can burn carbohydrates, fats, and proteins for energy (and alcohol, but that is not relevant here), and the ability to readily switch between them is considered metabolically flexible.

It was an essential trait of our ancestors for survival — when food was scarce we were dependent on being able to go hunting or foraging on our fat reserves; without this ability we wouldn't survive. Glycogen depletion from overnight fasting leads to an increase in [signaling pathways](#) that cause more fat burning.

This idea was put to the test in a landmark study by [researchers from Japan](#), who recruited healthy, recreationally active men to perform four experimental sessions locked within a metabolic ward. This is a tremendous strength of the study, as the metabolic ward allowed for complete control of the participant's life for the time they spent inside.

On multiple occasions, the participants did an hour of cardio either before breakfast, after lunch, or after dinner. All of the exercise sessions, regardless of when exercise was done, burned the same amount of calories, but the amount of calories that came from fat was far greater in the fasted group. **The difference amounted to about 250 to 300 calories of fat, or roughly one extra pound of fat loss per week if done every day.**



The researchers also showed that the amount of extra fat burning was directly related to the magnitude of the calorie deficit created by exercise, meaning that **more intense or longer workouts will burn more fat**. And we have the data to back that up. Studies comparing [fasted and fed HIIT workouts](#) have also reported that fasted training leads to greater fat burning.

Unfortunately, the [only study](#) to compare fasted and fed cardio for their effects on body composition didn't report any statistical differences. But there are several limitations with study. Food intake wasn't controlled; an hour of light cardio was done just 3 times per week; and the study lasted only 4 weeks.

Based on what we know about human physiology and the available research investigating how fasted training affects fat burning, training more frequently for a longer time while dieting is likely to show fat loss benefits.

But we can do more! We can actually further increase fat burning by having a protein shake beforehand. When we talk about fasted training, we mainly just want to avoid carbohydrates, which are what lead to less fat burning. You could train completely fasted, but [we have research](#) showing that **consuming some pure protein beforehand leads to greater fat burning than completely fasted training.**

## NEAT Is The Foundation



Although our focus in this lesson is on exercise, we can't not talk about the foundation of physical activity for fat loss: NEAT (non-exercise activity thermogenesis). We really dove into this topic when talking about energy flux, and it needs to be mentioned again

here.



The leisure activities we do in our day-to-day lives is paramount for fat loss. That means sitting less and being stationary as little as possible each day. Only once you have this foundation should you then even worry about whether you're doing cardio vs. weights vs. intervals vs. whatever else.

Why? Because without ample NEAT each day, you're mostly just spinning your wheels, since **sitting time will cancel out most of the metabolic benefits from your workouts.**

In a [landmark study](#) out of the Human Performance Laboratory at the University of Texas, Austin, researchers discovered what they called "*exercise resistance*". They recruited both regularly sedentary and recreationally active men and women to sit for 13.5 hours per day for four days before completing a hard, hour-long treadmill workout.

Being sedentary for the four days before exercise completely negated the metabolic benefits of the workout. That's not unrealistic either, considering that many people sit for 8 hours per day at work, sit for 2 hours driving to and from work, and sit for several more hours to eat and relax at home.

In fact, greater amounts of sedentary time is [associated](#) with worse health, including a bigger belly, independent of how much exercise people get. [One study](#) even found that increases in fat mass were similar over several years between people who were sedentary their entire life and those who used to be active but became sedentary during the study, while fat mass was lowest among those who were regularly active and those who used to be sedentary but became active during the study.

**A past active or sedentary life doesn't matter; what matters is being active now!**

Stop focusing on whether you're doing P90X or CrossFit or the latest "afterburn" interval workout. Instead, start concerning yourself with keeping total daily sitting under 4 hours (under 2 hours if you really want to step things up), and move your body as often as possible throughout the day.

I'm not talking about any sort of strenuous "exercise", I'm talking about not sitting, and instead doing gentle, non-strenuous movement throughout the day.

This not only will allow you to actually reap the metabolic benefits from the workouts you're doing (instead of losing all the benefits), but will also have far-reaching impacts on improving your overall health, energy level, vitality, and overall metabolic function.

This is not just an "optional" strategy for health or fat loss — **this is an essential requirement for normal healthy cellular and metabolic function.**

Start with that. Then — and only then — worry about your workout routine.

# The Ultimate Fat Loss Exercise Regimen

So let's say you wanted to put together all of the research into one ultimate fat loss exercise regimen... let me show you what that would look like:

- Have a foundation of ample gentle movement or NEAT during the day.
- Do resistance training (on a progressive and periodized program) at least 3-4 times per week. We offer specific training programs according to your individual fitness levels and goals.
- Do HIIT at least 1-2 times per week on non-lifting days.

- Do some of your workouts fasted.

Simple, right?