Welcome to Module 8 Lesson 2. In this lesson we will delve deeper into the subject of metabolism, we’ll also talk about exercise. There’re a lot of myths out there that we are going to debunk.

**What We’ll Be Covering Today**

Today we will cover: why the metabolism is confusing, the difference between metabolism and metabolic rate; why being slimmer doesn’t help metabolic rate; diet and metabolism myths exposed; and we’ll look in depth at the role of exercise.
Metabolism is Confusing

First, I want you to get this: metabolism is a cool word in the media world. You see all sorts of books with titles like, how to boost your metabolism and *Fifteen Foods that Boost Your Metabolism*. It’s kind of funny.

You’ve probably heard that green tea boosts your metabolism. It has this compound called EGCG that supposedly helps you burn fat. Yogurt helps you burn your metabolism; almonds, coffee. There needs to be a distinction here between what actually helps you lose weight and what boosts your metabolism.

First of all, the notion that metabolism is kind of like energy, whereby if you have more energy, you must have a higher metabolic rate. So you see people jumping all around, and you think, *Wow, They’ve got to have a high metabolism*. Well, that’s false. Part of it is semantics.

First of all, what is energy? Is energy calories? Is it kind of this feeling of vigor? Is it something else that we can’t necessarily quantify? It’s tough to really measure what energy is, and in relation to *metabolism*, what does that even mean?

The problem is with semantics, the definitions of these words. You’ll soon learn that there’s a big difference between metabolism and physics. Understand that if you’ve been led to believe that you have a broken metabolism and that’s why you can’t lose weight, as an example, it might not be true and why physics is probably more important.

Obviously, we talked in the first lesson about some of the things happen inside of us hormonally and physiologically that might slow down our ability to burn fat, but let’s never use that as an excuse to lose weight and burn fat specifically. I’m even going to argue that you don’t actually want an elevated metabolic rate on a consistent basis.
Metabolism

Metabolism is the sum total of catabolism and anabolism. Catabolism is the breaking down of things in the body, and anabolism is the building up of things in the body. For example, when you work out you break down your muscle. That would be catabolism. After you work out, your body repairs itself. That is the anabolism. Insulin is an anabolic hormone; it helps you build up. It stores fat; it stores glucose, epinephrine, glucagon, and cortisol. Those are catabolic hormones; they break things down.

It’s important to understand that even though I just mentioned that catabolism generally occurs, as an example, during a workout and anabolism occurs after a workout, that’s really not an accurate depiction of what happens, because both of these processes occur at the same time 24/7 in different areas of the body. Right now there are certain aspects of me that are breaking down while others are building up and the same thing’s happening inside of you.

As an example, GI cells take about 24 hours to turn over, so that’s a very fast turnover rate between their breakdown and buildup. On the flip side, red blood cells take about 3 months to turn over, so there’s a big difference. In red blood cells the metabolism’s a lot slower than in the GI tract.

Think about it this way, your body is like this massive construction site. Things are being taken down and built back up, metabolism is simply the word to define that.

Metabolic Rate

Metabolic rate is the energetic cost of metabolism. It is the amount of energy that is required for all chemical reactions in the body, catabolism and anabolism, which encompass all of reactions that take place to build things up and break things down.

Metabolic rate is how many calories you are burning to basically conduct those reactions. This is pretty much at rest, so we’re talking about your energy expenditure. We talked about total daily energy expenditure in the last lesson,
and when we include activity level in there it increases, because now, not only is there basic metabolism type of needs you’re also tacking on exercise, which will increase catabolism and anabolism.

Metabolic rate is what we tend to think of when people use the term metabolism. What they’re mean is, “Hey, you burn a lot of calories.” For the longest time my friends were like, “Oh, Yuri, you can eat whatever you want. You have a high metabolism.” Really? Well, how do you know I have a high metabolism? Do you mean I have a high metabolic rate? And even if that’s true, how do you know that?

**Components of Metabolic Rate**

The components of metabolic rate. We have a resting metabolic rate (RMR), which is pretty much while asleep and while awake, what’s going on in our bodies. This accounts for about 70% of total daily calories burnt. This is the biggest component of how many calories you burn; everything else is literally auxiliary compared to this.
Movement via exercise, which is still really not significant. Nonexercise movement; here we can kind of break this down into nonspontaneous or conscious movement. This would be like standing up from a seated position, walking around, bending, going inside the car; just basic activities. This is not a workout.

Then you have spontaneous or unconscious movement like twitching and fidgeting. Although it doesn't seem like much, if you were to do this all the time, it could account for a decent number of calories over the long-term that are being expended.

The biggest component in this graph is our metabolic rate at 75%. So, 75% of our metabolic rate is accounted for by our resting energy expenditure, as it’s shown here, or resting metabolic rate.

Resting metabolic rate is about 70 to 75% it’s a really big piece of the pie. The thermic effect of food is only about 8 to 10% in most cases. And the exercise component, is anywhere from about 15 to 20%. We’ll look at ways to make it more helpful, but, again, just realize that the resting metabolic rate is the key.
The thermic effect of food is the number of calories that the digestion of the food burns. Generally, mixed meals can account for about 8 to 10% of your daily caloric expenditure. You’ve probably seen there are negative-calorie foods, like celery. The energy required to break celery down is more than the calories you’re taking in. That might be true, but when you eat celery with other foods, it’s going to average out. If you eat 1,000 calories, if you’re lucky you might burn 50 to 100 calories from the thermic effect of food. That means that you still have 900 calories to store or use as fuel. You are never going to get ahead of this.

Therefore, the more you eat, the more you’re going to store; you’ll never get a negative number. You can eat all the negative foods in the world and hope that some of those foods will have a big enough negative effect negate everything else, it’s absolute nonsense. I don’t even know why we’re talking about it; it’s that negligible.

You’ve also probably heard that protein has a greater thermic effect of food and, in some cases, as high as 40% greater. Interestingly, it has little impact over metabolic rate. One study looked at protein in relation to other foods, and it found that it burned about seven additional calories per hour. 7 calories over 24 hours, is about 168 calories burned just because we’ve ate protein, and how much protein do you have to eat throughout the day to make that full 24 hours, seven calories per hour no one knows.

The thermic effect of food, don’t get caught up in eating specific foods because you’ve been told that they help you boost your metabolism, because they don’t.
More Myths About Food and Metabolism

Here are some more myths about food and metabolism with respect to meal frequency. I’ve looked at a lot of research and I’ve basically compiled the following for you, eating frequently throughout the day does not increase metabolic rate versus eating less frequently when calories are held constant.

So, if you eat 10 times a day or 1 time a day there’s really no difference in metabolic rate. You hear all these dieticians and health practitioners talk about, “Oh, it’s really important to eat 5 meals a day because the food is going to fuel your metabolism. Where are they getting their information from?

Meal frequency has nothing to do with metabolic rate. Total calories in can have an impact on metabolic rate, but it doesn’t matter if you have one meal or ten meals. A problem with the studies is what they define as a meal. An apple, in some cases, can be defined as a meal. If you have a coffee with two sugars and cream, well, that can be defined as a meal as well, so a lot of the studies are really flawed in the way that they execute them, but, generally, the frequency has no impact on metabolic rate.

Here’s another fallacy: Is breakfast really that important for your metabolism? Well, apparently this box of Wheaties thinks so. It says: “Jump-start your metabolism with a Wheaties breakfast.” Again, based on the reviews of the research, eating breakfast has no additional energy expenditure benefits if total calories consumed remain the same.

You’ve probably heard of breakfast diets and all sorts of gimmicky things. They take one aspect based on maybe one or two studies, and then they blow up these massive claims based on that. The reality is that when you look at the overall research, there really is, the differences are obviously different than one or two studies.

Yes, you’ll find studies that show that eating breakfast is helpful for losing weight but does that mean that one study is more valid than 99% of the other studies?

In the reviews of the literature on this subject, the consensus is eating breakfast has no additional energy expenditure benefits when total calories eaten throughout the day remain the same.
Breakfast was probably a term designed by food companies to sell more cereal. So, if I wake up at 6am and but I don’t eat until 9am does it still count as breakfast versus someone who wakes up at 8:30am and has breakfast right away? What if somebody wakes up at 10am and they don’t eat ‘til noon? Is that breakfast for them?

How do you define breakfast? Well, based on the word, it means break fast. There are all sorts of ways studies are defining breakfast. There’s some really sketchy science and gimmicks out there to promote and sell more products based on a couple findings or even a theory in some cases.

Total calories are more important than the frequency or specific meals throughout the day in terms of energy expenditure.

**Does a Slow Metabolic Rate CAUSE Obesity?**

The popular thinking is that if you’re overweight, you must have a slow metabolic rate. Here’s the thing: Most obese people have more lean body mass than lean people.

Let’s look at an example. Let’s look at the obese person whose 350 pounds at 30% body fat. 30% of 350 is 245 pounds of lean body mass. A leaner, fit person, at 180 pounds and 12% body fat would have a lean body mass of 159 pounds. Most obese people have a higher lean body mass than most lean people.

Obese people move more weight during activity than lean people. If you’re 350 pounds and you walk up stairs, you’re going to be working harder someone who is 180 pounds.

If you’re 350 pounds, you’re lifting 350 pounds against gravity, which means more work. If you’re only 180 pounds, you’re only lifting 180 pounds against gravity. Again, moving 350 pounds requires more work than moving 180 pounds, and, therefore, more calories are burned. Therefore, the average obese person has a higher resting metabolic rate than the average lean person.
Therefore...

The average obese person burns more calories than the average lean person at rest. Well, your resting metabolic rate is greatly determined by your weight, your lean body mass specifically and your height.

In General...

Generally, the taller you are, the more you’re going to weight. The level of activity you engage is also going to determine your metabolic rate based on the fact that you’re breaking things down and building things up and because of the activity level as a component of the energy expenditure on a daily basis.

This is why the obese person has a higher metabolic rate.

Metabolic rate has nothing to do with being slim or fit. In fact, you have a slower metabolic rate than somebody who’s heavier, simply because your metabolic rate is largely determined by your lean body mass, so whoever has the most lean body mass has the higher metabolic rate. Which makes sense because there is more chemical reactions happening inside your body, and that’s a reflection of your metabolic rate.
Let’s look at some other myths not as seen on TV. Here’s another idea. High metabolic rate is not associated with good feelings, as popularly believed. Many diseases that cause an increased metabolic rate also have symptoms like the following: fatigue, weakness, increased sweating, increased appetite, and insomnia.

Here’s something interesting. Intense exercise creates similar symptoms: fatigue, weakness, increased sweating, increased appetite, generally after the workout and insomnia if you work out late at night. So, exercise is an acute way to increase metabolic rate, but would you want to feel like this all the time? Probably not.

Beta2 agonist clenbuterol, which is a drug used by body builders and athletes as a bronchodilator to allow more oxygen into your lungs, as well as increase metabolic rate, can lead to fatigue, weakness, increased sweating, increased appetite, which is debatable, and insomnia.

A large meal can increase metabolic rate, leading to symptoms like fatigue, weakness, increased sweating, increased appetite, which, again, is debatable, depending on if you’re hungry after such a meal, and insomnia. Just think of your last big meal, maybe Thanksgiving. How did you feel after you ate, pretty energetic? Probably not; probably felt like falling asleep at the table. Sometimes you get this increased sweating, depending on what you’ve eaten.

These symptoms are very common, and they’re common across the board with really anything that increases your metabolic rate, whether that’s exercise, whether that’s a large meal, whether that’s a metabolic-boosting drug, or whether that’s a specific disease. These symptoms are not really what we typically associate with having a high metabolism or a high metabolic rate, and, if you ask me, this is not something I would want to have all the time. Sure, exercise for an hour at a high intensity; you’re going to feel pretty drained afterward, and that’s fine because there’re benefits to that acutely, but you don’t want to feel that way 24 hours a day.
The Truth

The truth is: Metabolism or metabolic rate does not equal energy. A higher metabolic rate equals an increased number of metabolic reactions inside your body leaving you feeling drained and lethargic. If you are sick, if you are fighting something, you will have a higher metabolic rate because your body is simply under more construction. If you’re pregnant, you will have a higher metabolic rate because you’re building a baby inside your body but it’s not associated with having bountiful levels of energy.

So, being sick increases your metabolic rate; you feel drained. A crazy exercise session increases your metabolic rate; you feel drained.

Remember This...

Remember this: The feeling of burning more calories is the exact same no matter the means used to achieve it.

Let’s look at some examples here. You do an intense workout, you feel tired, you’re sweating, you might get a little bit hungrier, and you’re fatigued. Those are the symptoms; those are the feelings of your body burning through calories. That’s why I always say if you’re exercising and you’re huffing and puffing, that’s a good sign because you’re burning calories. If you eat a heavy meal and you feel the same way, your body’s actually burning a lot of calories.

It has to digest the food you’ve just eaten, and in order to digest the food, it requires energy to do that. And in order to produce energy, your body needs to burn calories. Calories are a by-product of energy production. If our body needs energy to heal or digest food, it requires energy.

That’s why the feeling of burning more calories is the exact same no matter the means used to achieve it. It’s always the same feeling. If you ever feel tired, your digestive system is sluggish, you’re fighting something, you just had an intense exercise session you know that your body is using more energy to do its job.

One of the reasons why a raw-food diet is so powerful at boosting your energy levels is because it allows your body to move or divert more of its energy away from burning calories, for instance you eat a raw-food meal, you’re naturally
getting I more food enzymes that allow those foods to be digested without your body having to require its own energy to digest those foods, and, therefore, you feel less lethargic. They actually *decrease* your metabolic rate.

**Counterintuitive Findings From The Research**

Clinically, and I’m talking about in a laboratory setting; we’re talking about studies here diet versus diet, plus exercise results in the same amount of weight loss. This is totally opposite of what I’ve said before, probably what most people have ever told you. If you want to lose weight, you need to combine diet and exercise. That’s the only way to sustain it in the long run, versus diet alone. Well, the interesting thing is that the reviews of the literature show that diet versus exercise versus just diet lead to the same amount of weight loss.

There are a lot of different reasons for this usually, the test subjects are pretty overweight; never exercised, so there are a lot of different variables that account for this. In the real-world this might be different, and I would still encourage you, obviously, to exercise, because exercise has tremendous benefits.

Once weight is lost, the health and metabolic effects are equal between the two groups, so between the diet versus diet and exercise. The health benefits are almost always dependent on actually losing weight, not on how the weight was lost. If you lost 50 pounds through diet alone versus exercise and diet, it seems like there’s really not much of a health benefit difference.

Although the research shows this, I would say it’s debatable. If you don’t exercise, you’re not going to feel as fit and vital as somebody who does. You’re naturally increasing your level of performance and vigor in everyday life. I believe we’re all performance athletes in some way, shape, or form. Exercising is very important but according to the research, the health benefits are really only about losing weight.

This makes sense to some degree because when you are heavier than you’re supposed to be, your heart has to work harder to support all that weight. It has to pump harder. It actually grows in size to some degree to meet all this massive volume that you have. If you’re lighter, there’s less stress on the heart, as an example.
Weight and Metabolism

Let’s talk about weight and metabolism specifically this equation for running and walking. For running and walking, energy burned is 1 calorie per 1 kilogram of body mass per kilometer moved. Let’s look at an example. A 200-pound or 90-kilogram person going for a five kilometer walk will burn 450 calories during that walk.

Let’s say you’re on a weight-loss schedule and you initially hop on the treadmill at 200 pounds. Four weeks later you come back after doing stuff to help you lose weight and you’re 180. Well, now at 180, you’re actually going to be burning fewer calories based on this equation.

I should mention that this is inclusive of your metabolic rate, so if you’re resting metabolic rate, let’s say, is 300 calories during that specific time frame and then you go for that walk for five kilometers, you’re really kind of just adding on 154 calories during that walk. This equation is inclusive of your resting metabolic rate, not on top of that.

**Does Exercise Help Us Lose Weight?**

The important thing here to remember, again, is that the lighter person is going to burn fewer calories because they are moving less weight.

So, does exercise help us lose weight? It’s very easy to overeat by 3000 calories in a given day but it is impossible to raise our resting metabolic rate by more than a thousand calories per day. It is physiologically impossible no matter how much you exercise or how much muscle you put on, you’re never going to increase your resting metabolic rate by more than a thousand calories per day. That tells us something; it’s actually a little bit easier to control our weight by food than it is to exercise.
Your major organs like your heart and liver are more metabolically active than your muscle. Your liver is constantly going. It does over 500 different functions therefore; it’s very metabolically active so it’s actually going to burn more calories than muscle will. The same with your heart and brain; they will burn more calories than your muscle.

Per pound, muscle burns about 5 to 6 calories at rest. You may have seen other numbers that say your lean body mass burns 20 to 30 calories at rest. Well, that’s because that higher number includes everything other than fat, 5 to 6 calories at rest. That’s not a whole lot.

Even if you put on 10 pounds of muscle, that’s an additional 50 to 60 calories per day, more or less, of burning fuel. If you were to gain 10 pounds of muscle, its contribution to metabolic rate would be small but still helpful. Again, 60 extra calories to your metabolic rate per day is still better than no calories. It’s still helpful but it’s not massively significant, as you may have been led to believe. But I am still a huge advocate of adding muscle. We’re made to move; muscle helps us move. It makes us feel…performance, stronger very important but from a metabolic rate very marginal differences.

To give an example here of how tough it is to burn extra 2,000 calories per day, a 150-pound person would have to run 20 miles every single day. Good luck with that one. Unless you’re going to be running half-marathon-type distances every single day for the rest of your life, burning an extra 2,000 calories, it’s going to be pretty tough. That’s why the saying “You can never out run a bad diet” is so true. It’s very easy to eat two thousand calories. You go to McDonald’s and you have it right there in a meal

Again, the heavier you are, the less work you’ll have to do to burn those calories. That’s what we just saw in that equation. If you’re a heavier person already, you’re going to have to do a little bit less work to burn two thousand calories, whereas if you’re somebody who’s lighter, you’re going to have to do a lot more work to burn those extra calories.

It’s easier and more effective to reduce caloric intake than to increase energy expenditure. That’s typically why there are so many diet programs, and that’s typically why people are more, I guess, and we’ve seen this with our own business too, people generally will respond more favorably to starting a
diet program, changing something about their diet, than they will to start an exercise program, because it’s easier. It’s easier to eat less or eat something different; it’s a lot harder to kick yourself in the butt to work out, let alone doing 20 miles every single day.

The Role of Exercise

Even though we’ve seen that exercise has marginal effects on metabolic rate, the reality is that if you want to look great, if you want to look lean, muscular, if you want to feel strong, you don’t do that by eating. That is created by working out.

Exercise has marginal effects on metabolic rate but, over time, can make a big difference. Over time is when big thing is coming in with exercise. It’s a long-term investment in yourself; it’s not something you’re going to notice tremendously tomorrow, metabolically. You’re going to feel great; you’re going to have those neurotransmitters—the dopamine, serotonin, all those great neurotransmitters that make you feel great. You’re going to notice that with higher-intensity workouts, but that’s not the same thing with metabolic rate.

So, all forms of exercise, whatever it is walking stairs, walking up a hill whatever you want to do is helpful, but two specifically are more effective at burning more calories, and they are strength training and high-intensity interval training.
Let’s look at strength training, building muscle, and resting metabolic rate. It’s tough to increase your resting metabolic rate significantly, but the only healthy way to do that is by gaining weight via muscle. In the long-term, if we want to actually increase our metabolic rate, we’ve seen that the most important determinant of that is our lean body mass, so unless you’re getting a heart transplant, where your heart is ten pounds heavier than your previous one, the only way to really do that is by gaining muscle.

So, improving body composition is what we’re after. A proper diet will help you avoid gaining fat but exercise is really what’s going to pack on the muscle.

When it comes to building muscle, it’s not so much how much protein you eat; it’s the number of calories you eat to sustain the anabolic of more muscle. When it comes to losing fat you can tweak your diet to reduce sugars, rancid fats, high amounts of saturated fats, you can also do things with exercise to increase your body’s ability to burn fat, and we’ll look at some of those.

180 pounds at 20% body fat, your lean body mass is 144. You have more body fat, less lean body mass than the second example, which is 180 pounds at 10% body fat, which means your lean body mass is now 162 pounds so you’ve increased your resting metabolic rate, because now you have a greater lean body mass.

**Strength Training and Burning Calories During and After Workout**

Strength training. High-intensity training in general, increases catecholamines which speed the breakdown of fat and glycogen for immediate fuel. It’s going to break down fat stored specifically throughout the body.

A 2001 study in the journal *Metabolism* measured the effects of resistance training on resting metabolic rate and fat burning discovered a 62% increase in fat burning 16 hours post exercise. That’s pretty good, right? That’s pretty good.
**Why Strength Training Burns Calories**

Why does strength training burn calories? Muscle has been broken down, catabolism, and is subsequently rebuilt, anabolism, in order for this happen energy is required and energy requires calories.

If you’re building a new building, you need workers. Workers in this case would be energy, and what do workers need in order to work? They need money. Your money would be your calories. You can say that the workers are burning through money. You can say the same thing about your muscles; your muscles are burning through calories.

Also, heart rate becomes elevated during the strength-training workout. If you sat on a bench and did a dumbbell chest press, you’re elevating your heart rate because you’re demanding more muscle to become involved, and more muscle requires more oxygen and so forth. So, heart rate becomes elevated, which increases the metabolic demand. The heart has to pump harder to deliver the blood, because now there’re more muscles involved, so that blood which is carrying the oxygen needs to be circulated more quickly to those muscles to get the oxygen to the muscle cells, where they can produce energy, and they burn calories as a result of doing that.

Cells become oxygen-starved as well during a strength-training workout and require time, oxygen, and energy, and thus calories, to replenish the deficit. This is known as EPOC, or your excess post-exercise oxygen consumption. Typically, strength training is a lower duration which is typically classified as anaerobic or without oxygen, meaning your cells are producing energy without oxygen, so they’re using sugars in a process called glycolysis, and because of that, they need to replenish this oxygen afterward and this is where EPOC comes in.
Strength Training and Physics

**WORK = Force x Distance**

**Calories Burned = Weight x Distance Moved**

Remember earlier, we were talking about walking up the stairs as a 350-pound person versus walking up the stairs as a 180-pound person? Well, here’s why that works the way it does. If you remember back to physics work = force x distance, in this scenario this means, calories burned = weight x distance moved. Calories burned are a measure of work. Force equals weight and distance moved is distance.

If you’re 350 pounds, that would be the weight or the force. If you’re moving up a set of stairs that are ten feet high, let’s say, well, you’re moving 350 x 10. If you’re 180 pounds, you’re moving that same distance; well, now you’re doing 180 x 10. It’s a very, very different amount of work that’s being done and, therefore, a different number of calories being burned. If you understand this, everything you do with your workouts will make a lot more sense, specifically if you’re looking to lose fat.

Let’s look at the person on the left here. He’s doing a bicep curl, and the bicep curl. We have this little red arrow which shows the vertical distance that the weight is traveling. Not a lot of work being done there, right.
Let’s look at the picture on the right here. This individual is doing a clean and press taking the weight from the floor to above his head. Let’s say this individual is six feet tall, he’s moving, let’s just say 50 pounds, so not a lot of weight. 50 from the floor to another foot above his head; let’s call that seven feet. 50 times seven feet is $350 \times 20$ (20 pounds times one foot). So, 350 over here versus 20 over here. The number representing the number of calories being burned. Again, what you need to understand is that moving more weight over a greater distance is the formula for fat loss success with strength training specifically.

If your goal is to lose fat it’s all about creating a caloric deficit. So, if your goal is to lose fat, which is essentially burning calories, i.e., work, you must lift heavier weights, thus force, using full-body exercises, which represents distance. This is what you need to understand, this is what the media needs to understand, this is what aerobics classes with people lifting two-pound dumbbells need to understand. If you’re a woman, you will never bulk up like a man will bulk up. You don’t have enough growth hormone, you don’t have enough testosterone to do that.

The fear of bulking up has cost more women beautiful bodies than anything else. It’s a myth. It will not make you bulky, especially if you’re a woman. You need to be lifting heavy weights for a number of reasons. First of all, for bone health. The more you stretch your muscles, the more those pull on your bones. And the more there’s a pull on the bones, the more the bones need to hold on to minerals, like calcium. What is one of the best preventive factors for osteoporosis? Weight during exercise. But not lifting two pounds; lifting heavier weights.

Secondly, if you have kids, you’re going to pick your kids up, right? They might weigh 20 pounds, 30 pounds, 40 pounds. What’s the benefit of lifting five-pound dumbbells? Train how your body is going to be used in real life. You want to get stronger, not weaker.

Until the day I die, I will continue spreading this message of work = force x distance. That’s it; that’s all you have to know. Also, from a fat-loss perspective, increasing the intensity of your workouts is important, and one of the ways you can do that is by limiting your recovery time.
Principles of Training and Fuel Utilization

Let’s talk about principles of training and fuel utilization and a very big myth that needs to be overcome. This first graph talks about the effect of exercise intensity on fuel selection. By “fuel,” I mean carbohydrates and fat. Those are the two main sources of fuel we use during an exercise session.

As this graph shows, we have exercise intensity on the bottom here and the energy from carbohydrate and fat on the Y axis. As exercise intensity increases, we have more reliance on carbohydrates and less reliance on fat. You’ve probably seen something like this, or you’ve been told by cardio machines that in order to be in your fat-burning zone, you must work out at a lower intensity, 60, 65% of your maximum heart rate. This has caused a lot of confusion.

As I mentioned earlier, in the long-term we’re looking at losing fat. All that matters is a caloric deficit, because your body is going to choose where it’s going to take calories from after your workout, so during your workout, it doesn’t matter what you’re using as fuel because most of the burning of the calories is going to be occurring after the workout anyways, and your body, at that point, is going to be selecting whatever fuel sources it needs to go through those calories with.
What’s more important burning more calories during your workout.

If your goal is to lose fat and thus burn more calories, you must lift heavier weights using full-body exercises, from a strength-training perspective. When you’re lifting heavier weights with full-body movements, how do you think you’re going to feel? We talked about burning calories and the feeling being tired, maybe a little bit of weakness, sweating, huffing and puffing. Those are the symptoms, those are the feelings you want to feel when you’re working out to lose fat.

The same thing with your cardio. Increase the exercise intensity and what happens? You start huffing and puffing and getting more tired. We’re now increasing our metabolic rate, which, in the short-term, is important because that means we’re burning more calories. It doesn’t matter if more of those calories are coming from carbs.

Exercise intensity is the most important factor in your ability to burn fat. That’s it. Intensity is the most important thing you need to worry about.

Let’s look at the effect of duration on fuel selection. This graph shows that the longer you exercise, the greater the reliance on fat, the less reliant on carbohydrates. Again, this multiplies the myth created from the previous graph. In conjunction with that, if you exercise at a lower intensity, you inherently are able to exercise for a longer duration, which means that you’ll burn fat and
that’s true. If you wanted to go on elliptical and spend three hours at a very low intensity, then that’s great, but I would not advise that because it’s a waste of time.

You’ll notice that as the exercise duration increases the less reliance there is on carbohydrates and that makes sense. That’s just the way the body shifts in terms of its fuel selection. Again, if you have three to four hours a day to waste your time on a cardio machine, by all means, go for it. But if you want to get amazing results in less than 45 minutes, then follow some of the advice that I’m talking about right here.

We want to shorten the duration of our workouts, and we do that by increasing the intensity, because you cannot go crazy intense for very long. A sprinter doesn’t sprint a marathon; he sprints 100 meters. So, intensity is key.

**Intensity is Key!**

This is a study from 2002 in the *New England Journal of Medicine* that compared a control group with several experimental groups, and they went through 8 months of either low-volume, moderate intensity; low-volume, high-intensity training; or high-volume and high-intensity exercise. All of protocols led to positive changes in overall lipid profile in overweight subjects.

The high-volume and high-intensity group also gained the best training fat loss and blood lipid effect. What this means is that exercising at a higher intensity more often is better for performance, fat loss, blood lipid levels, based on this study. I wouldn’t necessary recommend doing high volumes of high-intensity work all the time because that’s how you burn yourself out but when you follow a properly design program which combines elements of high intensity with elements of recovery and maybe some longer duration, lower-volume stuff, that’s when you get the best effects. I just wanted to show you this study because it basically shows that intensity is what it’s all about.
The Role of Interval Training

Let’s talk about interval training. The yellow bars represent low-intensity recovery bouts. I’m using an example here of an interval-training protocol which is repeated bouts of low and high intensity. Our low-intensity or recovery bouts are 60 seconds and our high intensity work bouts are 30 seconds.

Here’s what happens. We have a total work time of 13 minutes, and we start off with 60 seconds of jogging, 30 seconds of sprinting; 60 seconds of jogging, 30 seconds of sprinting; back and forth, back and forth. We do that eight times, for a total of 13 minutes. I think that works out to about 13 minutes. So, here’s where interval training is so amazingly powerful.

If we look at the top bar here, it shows fluctuating actual heart rate. This is what your heart rate does during a workout. In a recovery bout it’s lower. In a work bout it goes up. In the next recovery bout, it doesn’t quite get to the baseline level unless you’re recovering for ten minutes. There’s not enough recover time, and that’s why we talked about decreasing the recovery time is one of the easiest ways to increase the intensity of your workout. I’m going to show you a very simple example of how to do that once I explain this.
We work again, heart rate goes up. Recovery, it doesn’t quite come back to the same line. Work again, it goes up; recovery, again not quite down. It keeps going up and up and up. This dash line represents your average heart rate. What happens to your average heart rate during the course of 13 minutes? It increases and that’s amazing because what that means is that over the duration of your workout, you’re spending more time at a higher percentage of your maximum heart rate, and that is the secret to improving your performance as an athlete, if you want to run faster or whatever performance goal you’re after.

The other cool thing is that the more time you spend closer to your maximum heart rate, the more calories you burn. Let’s go back to the equation work = force x distance.

We’re not changing the force when we’re running, but we’re changing the distance by running faster. We’re covering more distance, which means that we’re doing more work. Don’t you just love that? It’s amazing. Interval training is so powerful because it allows you to spend more time near your maximum intensity, and that means you’re doing more work and burning more calories.

If we wanted to make this specific workout more challenging, what could we do? Well, I just talked about recovery time, so we could take our high-intensity workout, leave it at 30 seconds, but let’s drop the recovery bout to 30 seconds. So, if you’re running as hard as you can for 30 seconds and you’re only recovering for 30 seconds, do you think you still might be huffing and puffing after 30 seconds of recovery? Yes, and that’s why recovery is kind of an illusion with interval training, but that’s why interval training is so powerful at helping you burn calories.

Again, what are you going to be experiencing while you’re doing this? Huffing and puffing, fatigue, weakness, increased sweating; all symptoms of an increased metabolic rate, which means you’re burning more calories.
EPOC is excess post-exercise oxygen consumption. How many calories or how much oxygen your body requires after it’s done working out to come back to homeostasis, which is the baseline level. The higher the intensity, the higher the EPOC. The more intensely you work out, the more you huff and puff, the more you are expending energy, the more oxygen that is being deprived out of your body.

Even though you’re breathing heavily, you think you get more oxygen in, but what’s happening is, you’re creating an oxygen deficit, and because of the deficit, your body requires some time after you’re finished working out to make up that difference. It needs to get the oxygen back into your system and that’s called EPOC.
Intervals vs. Continuous Low-Intensity and EPOC

The journal *Metabolism*, 1991; subjects completed exercise bouts at intensities of 29, 50, and 75% of their VO2 max, which is, again, their maximum aerobic capacity or, essentially, their maximum heart rates; we'll just kind of use those interchangeably. They did this for 80 minutes. Which group do you think had the highest EPOC? It's pretty self-explanatory.

The greatest EPOC was reported following the highest intensity, 75% of VO2 max, with 30 liters of oxygen consumed or 150 calories burned. It's generally accepted in physiology that for every liter of oxygen you consume, you burn five calories. That's why when you huff and puff, that's a great thing, because you know that you're huffing and puffing, consuming oxygen, and thus burning calories.

Additionally, the duration of the EPOC following the highest-intensity exercise was significantly longer when compared to the lower-intensity bouts: 10.5 hours versus 0.3 and 3.3 hours. That's a huge difference. You're essentially burning calories for almost 11 hours after an 80-minute workout. We don't need to work out that long, but ten and a half hours; that's pretty awesome.

Another study in the *Journal of the American College of Nutrition* in 1997 investigated the effects of low-intensity, 50% and high-intensity, 75% exercise on the EPOC response.

Energy expenditure during both exercise bouts was actually the same: 500 calories, they kept them the same. The higher-intensity bout caused a significantly higher EPOC than the lower-intensity bout. We had nine liters of oxygen consumed after the workout, or 45 calories burned, versus 4.8 or 24 calories. Again, those numbers don't seem like a lot. 45 calories after a workout? Who cares? It's better than 24 calories.

If you're going to work out anyways, you might as well work out less, because in this study they kept the calories at the same amount, 500 calories, so the lower-intensity group had to work out longer to burn those 500 calories. You might as well work out less at a higher intensity, burn more calories during the workout and burn more calories after the workout.
A 1997 study in the *Journal of Applied Physiology*: continuous running, 30 minutes at 70% versus an interval run. It was 20 bouts of one-minute duration; basically a sprinting speed. Significantly greater EPOC following the intermittent bouts of interval runs: 15 liters, or 75 calories, versus 6.9 liters, or 34.5 calories. Repeated sprints, very effective at, obviously improving performance. If you’re an athlete, you want to be able to sprint repeatedly, not just go for a nice little jog, and in terms of being able to burn calories, it’s more effective.

Again, the EPOC, we’re talking about calories that are being burned for hours afterward, while you’re sitting on the couch, watching TV.

Greater EPOC following an interval run. Two times 25-minute sessions at 70% they burned 15.5 calories afterward—again, it’s not huge—versus continuous running for 50 minutes at 75%. They did the same protocol. 50 minutes, the interval group broke it up—2x25 at a lower intensity, slightly lower intensity, and *still* burned more calories after the workout than the group that did slightly higher intensity for 50 minutes, which is kind of interesting. I wouldn’t say this is a normal result, but, again, the nature of interval training is very powerful at helping you burn fuel.

### Why Interval Training Works

So, why interval training works. This is another important concept to understand. Interval training works because it’s very inefficient. It’s like driving in stop and go traffic. You know that driving on the highway gives you more gas mileage versus driving in the city because on the highway, you’re going at a continuous speed for the most part, versus in the city, you’re basically interval training with your car. You’re stopping and going. Your car is burning more fuel; your body does the exact same thing.

Stop and go, sprint and jog, sprint and jog. Dammit, I would just rather run continuously. That would be the natural path of least resistance. That’s the easier way of doing things. Interval training is inefficient. Our body burns more fuel as a result.
Summing Up

Let’s sum this up. I could talk about exercise and these principles until the end of time. They’re very, very straightforward and simple to understand, and people have made them too complicated.

Losing weight and metabolism have more to do with physics than anything else specifically work= force x distance. Moving more and more intelligently, as we just saw, and eating less are the only sustainable ways of losing weight and keeping it off. We looked in the last lesson at a lot of the hormonal stuff and stuff that’s happening physiologically that might impair our ability to burn fat and lose weight. That stuff, it does have a role, but physics is more powerful.

Your ability to lift heavier weights and move them greater distances and, thus, burn more calories will make a greater difference than anything happening inside your body. Your ability to create a negative caloric deficit, meaning eating less and moving more, is going to be more powerful than anything happening inside of you, and that’s what I really want you to understand.

You are in complete control of your body, I know we all have different things going on, thyroid issues, adrenal problems, whatever. We can still overcome those and lose weight by applying the principles that are based in physics that we’ve just talked about.

I hope this has made a lot of sense for you. Again, go back through this presentation if you need more clarification. If you need any questions answered, ask me in the comments.
Your Assignment

For your assignment I’d like you to go through one of the Super Nutrition Academy workouts. I want you to experience the feeling of increased metabolic rate, because the SNA workouts are based on helping you get stronger and burn fat, which means they’re higher intensity in nature, and they incorporate all the principles we just talked about.

I’d like you to experience what that feels like because that is what having an increased metabolic rate feels like. The next time somebody says, “Hey, you have a high metabolism,” well, unless you’re huffing and puffing and weak, you probably don’t.

I want you to document what you experience and then share it in the comments. If you currently have the workouts, just go through one of the workouts. If you don’t have the workouts, we’ll put up a page where you can access them. If you use any of my other workouts, whether that be the Amazing Abs Solution, the Unstoppable Warrior Adventure workout, Fitter U Fitness, you can use any of those workouts; they’re all based on the same principles. I’d like you to share your experience in the comments because I think it’s very, very interesting.
Coming in Lesson 3

Coming in Lesson 3, we’re going to be switching gears a little bit and talking about testosterone and then in lesson 4 estrogen and more female stuff. I’m going to give you a really good understanding of testosterone. We’ll talk about the andropause mystery and how to stay manly as you age. This is a growing concern amongst men in the Western world. We’ll find out why this is happening, what we can do to stay manly as we grow older, and that’s coming up in Lesson 3.

Thanks again for joining me in today’s lesson. I had a great time putting this together for you. I hope you got a ton out of it, and I’ll see you in Lesson 3.