Welcome to my 9000 word guide on how to completely transform your aerobic fitness — the base fitness that allows you to recover quicker, go longer, and be more powerful during training, fighting, and sparring.

Make sure you read my Intro to Energy Systems article — you'll likely need it to understand how this all works.

**WARNING**

**READER MAY ACTUALLY LEARN SOMETHING IN THIS POST**

However, writing about energy systems and how to train them is complex — it's not an easy topic to explain, teach, or even put into practice, and there are many different approaches and theories about how to go about it, with each theory quite a bit different.

I try my best to simplify things for layman, but I do try and provide detailed reasons WHY and HOW these systems work and how they can be trained.

This article applies specifically to improving your aerobic fitness for Muay Thai to increase your recovery abilities, your overall stamina, and your total work rate ability during training, sparring, and fighting.

If you want to skip the long explanation and theory stuff (I don't recommend it) and go RIGHT to the Training Protocols, CLICK HERE to go the training guide

**WHY AEROBIC FITNESS?**

Because building up a strong aerobic base makes you the equivalent of the energizer bunny — you can keep going, going, going, and going.

The goal with this guide is to help you unlock the keys to endless energy you can utilize when needed without gassing out.

And the key to this energy is to unlock the potential of your Aerobic Energy System — the fatigue-resistant energy production system that, with training, can provide you with huge increases in endurance and stamina.

Are you ready to change to never gas out again during Muay Thai?
Then keep reading.

My theory here is that you should understand WHAT you are trying to TRAIN and HOW that training actually improves your biological systems.

Understanding this means you can better target your training and know specifically what you are doing.

Knowledge is power and in the case of Strength and Conditioning, Knowledge and the right training can lead to better performance in your sport.

This is probably the most comprehensive FREE article you can find online about how to improve your fitness (specifically, your aerobic fitness). Not only do I just talk about the training principals, but I go into great detail about how to specifically train each system and what to do. Pretty much every other source you will find charges you for this information or sells a book, or makes you sign up for a paid membership.

But as the information that inspired my interest in the topic was free and I learned based on free information over the years, and all this stuff is out there in the wild and available if you look for it, make a study it and actually apply it to your training, I've decided to go ahead and just give it away to your guys.

So please share it around, use it, comment it, and offer feedback on how it worked for you. It would be a serious waste of the 100+ hours I spent creating this if you guys read it and then just throw it in the garbage.

I recommend you sign up for my new newsletter Muay Thai Fit. This is a different newsletter than the main site one as it ONLY pertains to strength and conditioning, diet and nutrition, and other topics that relate to improving your body and your performance at Muay Thai (or other sports).

To see results, you have to PUT it into practice over weeks and months. Don't just be a keyboard trainee — actually get out there and TRAIN with it.

Anyways, let's start.

THE ENERGY SYSTEMS: A RECAP

We've given a very comprehensive look at how your aerobic system supplies energy to your muscles at the cellular level.

A brief recap.

The body can produce energy through three different metabolic pathways (we call these energy systems):

- Aerobic System
- Alactic Anaerobic System
- Lactic Anaerobic System

Today we want to talk about the Aerobic system, specifically how to vastly improve it and give you endless endurance and stamina during training, sparring, and fighting (and of course, benefiting every other area of your life).

Now let's talk about how to do it.

Note, if you want to skip straight to the training protocols, click HERE.

AEROBIC CAPACITY VS AEROBIC POWER

Though there are three energy systems, each of these 3 systems has both a power component and a capacity component.

So for the aerobic system (and each of the other systems), there are two types overall aerobic fitness improvements we can make to the body that can boost performance:

1. Aerobic Capacity (AeC) (How LONG your aerobic system can keep providing enough ATP to power you intensity without switching to anaerobic metabolism) and
2. Aerobic Power (AeP) (How fast your aerobic system can supply ATP to muscles before switching to the anaerobic system — that is how fast the energy can be produced)

AEROBIC CAPACITY

This is an important enough concept that I want to specifically define it.

Think of Aerobic Capacity (AeC) as the size of your overall Aerobic Engine.

The bigger your aerobic engine, the more oxygen you can shunt through your body to your muscles and the fitter you are.

The more oxygen you can consume and process (this is referred to as your VO2Max), the more ‘aerobic fuel’ your body can use with the right training the better efficiency at burning that fuel means more potential work ability. Every person’s AeC may be different, depending on genetics, but there is a huge amount of leeway that AeC can be improved via training.

Aerobic capacity is basically to take in, to transport, and to utilize oxygen at sub-maximal (aerobic) work for a sustained period of time.

Aerobic capacity depends on the following improvements:

1. Efficiency respiratory system (how much oxygen your lungs can take in and hold and how efficient those lungs are at extracting it)
2. Efficiency of oxygen transport via heart, blood, and blood vessels to the muscles
3. Efficiency of Muscles cells utilizing O2 to produce ATP

Training Aerobic Capacity to it's maximum is the goal of endurance-based athletes; higher aerobic capacity means a higher Lactate Threshold (Anaerobic Threshold) which means higher intensity (that is more ATP supplied and utilized) work rate draws only from the Aerobic system.

In the case of endurance athletes, they can run at very high heart rates while still using aerobic energy.

What does this mean? Having higher aerobic capacity means you can last longer at sub-maximal intensity, do more work ONLY using the aerobic system (higher anaerobic threshold), and recover faster.

Basically, it's a good, good thing.

AEROBIC POWER
Thai, this means you should, at some point, move from general training to skill specific movements while training to target a specific energy system. Movements pertaining to an exercise, you actually need to train with or with movements as close to that exercise as possible. In the case of Muay Thai, it is important to control your fight/competition, move to skill training which replicates the exact moves and times of your sport/competition.

So where am I going with all this? Well, to make specific improvements, you need to know what you are targeting and train for that specifically, using generation training strategies and/or sport-specific skill training that replicates the required intensity and duration to train a specific energy system and component.

The principle of specificity holds true when it comes to conditioning work to increase power and/or capacity. To see improvements in actual movements pertaining to an exercise, you actually need to train with or with movements as close to that exercise as possible. In the case of Muay Thai, this means you should, at some point, move from general training to skill specific movements while training to target a specific energy system.

### Targeted Training = Specific Adaptations to Energy System and Energy Component

1. Keep your body (mostly) deriving its energy from that energy system (‘energy system target training’)
2. Control the duration of that start of energy production (‘power training’)
3. Control the intensity of activity (‘power training or capacity training’) (McArdle et. al., 1991)
4. Control the rest time duration (‘capacity training’) (McArdle et. al., 1991)
5. Control the repetitions of activity (‘capacity training’)
6. Control the types of muscle fibers recruited (metabolic training)

Take a Muay Thai fight. Your Total Aerobic Capacity could mean you may be able to draw on Aerobic Power for a fight at a certain (lower pace) that lasts for 1 an hour before it runs dry.

But, as you know, the fight duration is only 15 minutes. This means your total aerobic capacity can’t be utilized because the duration of the event is in fact much less than your aerobics total capacity due to the time limitation. For an endurance sport like ultra marathon running, your total aerobic capacity is more important because it means the difference between collapsing after 5 hours or being able to finish 8 hours because you have a higher capacity.

Then there is how much of your Total Aerobic Capacity you can actually utilize during your event. The reason here is that your Anaerobic Capacity, because it interacts with your Aerobic system, actually limits how much Aerobic Capacity you can draw on (this is a long explanation).

While both energy systems are important, a sport like Muay Thai relies more on maximum aerobic power than maximum aerobic capacity. Though both systems contribute to your overall conditioning (remember, the bigger aerobic engine you have (aerobic capacity) the more aerobic power you can ultimate get out of it.

The overall ratio of aerobic power vs aerobic capacity in your body is optimized in favor of depends entirely on the demands you consistently place on your body; thus the activity or sport will dictate what direction you need to push your body’s energy systems in favor of aerobic power or aerobic capacity.

For Muay Thai, however, it’s more important to be able to deliver continuous power from your aerobic system (referred to as ‘aerobic power training’) than it is to go for hours just on aerobic energy at a lower work rate without fatiguing (referred to as ‘maximum aerobic capacity training’).

An analogy here is to compare a marathon runner, who’s body needs to be able to supply continuous aerobic for hours at a time at a higher aerobic threshold than normal (that is, at a faster heart-rate than non-trained individuals while utilizing only the aerobic energy system), to a Middle Distance (1500 meter run) athlete.

Both of these runners have different adaptations — the marathon runner having far more aerobic capacity to last 2-4 hours while the middle distance runner having far more aerobic power to generate continuous aerobic energy for the 3-4 minute duration of the event.

Muay Thai, with each 3 minute round consisting of explosive flurries that last 3 to 10 seconds, not to mention grueling clinch sessions that can last seconds to even minutes at a time, interspersed with short periods of no action relies more on aerobic power than capacity. An athlete does not need to access aerobic energy for hours, but rather only minutes at a time.

### Where Does Muay Thai Fit In?

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So where am I going with all this?

Well, to make specific improvements, you need to know what you are targeting and train for that specifically, using generation training strategies and/or sport-specific skill training that replicates the required intensity and duration to train a specific energy system and component.

Typically this means starting out with more GENERAL TRAINING that targets your energy system and component you want to improve and as you move closer to your fight/competition, move to skill training which replicates the exact moves and times of your sport/competition.
However, you can still make overall improvements to your body (heart adaptions, lung adaptions, more capillaries in your body, longer muscle fibers, more overall recruitment of muscle fibers potential, etc) with general training strategies (i.e. not skill work). For actual improvements to the power and speed and endurance of MOVEMENTS related to your sport though (like punching, and kicking), you will need to skill train. You often need to ‘build the base’ with general training and then capitalize on that base you built up by later training specific movements.

Here's an analogy.

Think of your fitness as a mountain with a ski slope on it and your ability to improve your fitness the same as trying to improve the speed and the length of that ski slope.

To improve the ski slope, you have two options: 1) make the ski slope steeper so there’s more speed or 2) make the ski slope higher so the ski slope is longer, higher, and has more potential to build up sections for more speed.

In the case of Aerobic Fitness, our idea is to first build a higher mountain than it was, then you can build up the ski slope ON that higher mountain and take advantage of the increased height you built — this gives you more overall length and, in some parts, potential to make more areas steep. Basically, there is more potential.

This may be an awkward analogy, but I hope it makes things somewhat clear why we want to build a general aerobic base fitness first before we specialize in more specific conditioning.

Now that we’ve broken down exactly the different components the Aerobic energy system into two components — (1) power and (2) capacity — we can look specifically at how to improve the efficiency of each component.

TYPES OF CONDITIONING YOU CAN IMPROVE

As stated above, you need to train specifically to target certain types of conditioning improvements.

There is no ONE exercise that will improve ALL aspects of your cardio.

We can specifically target different aspects of your conditioning and work to improve each of these (to a point) before you have to start sacrificing general improvements in favor of specificity.

CONDITIONING COMPONENTS YOU CAN IMPROVE THROUGH DIFFERENT TRAINING PROTOCOLS:

1. Your explosive power (power)
2. Your repetitive explosive power (capacity)
3. Your ability to sustain your work rate (power)
4. Your muscular endurance (capacity)
5. Your Max Duration of Total Available Energy Production (capacity)

These target different energy systems and different aspects of each energy system. To improve one, it must be targeted specifically.

Let me be clear here again: No ONE type of exercise or ONE type of training will improve ALL of these. Just doing ‘sprints’ or just doing long runs won’t target ALL of these systems but rather improve specific ones. The same goes for only doing long runs, or doing longer sprints, or shorter sprints, or any other combination.

It’s important you identify (depending on your sport and your style of fighting and your specific level of fitness) what energy systems you need to / want to improve and target those specifically.

Ideally, you are going to have to do a lot of different types of conditioning work to improve everything.

Want to be an explosive fighter? You will need to target those energy systems and metabolic processes that give you maximum explosive strength and the ability to repeatedly be explosive without gassing out. Increasing your overall explosive power, your explosive endurance, and your recovery time before explosive bursts require targeting your Anaerobic Energy system which we will talk about in our next article. However, improvements can be made to your recovery times between explosive bursts and your overall stamina by training for aerobic energy system improvements, which we will talk about in this article.

Want to have more overall endurance so you can sustain your fight work rate in round five just as easily as in round one? Then you need to train your overall aerobic energy systems to support this.

HOW TO TRAIN YOUR AEROBIC SYSTEM

I break this section and training exercises into TWO sections: Oxygen Supply Training, which focuses on pushing adaptions that allow your body to produce and supply more oxygen and Oxygen Utilization Training which focuses on exercises that work on adaptions that allow your muscles to more efficiently absorb Oxygen and generate and supply ATP at a faster rate.

THE BEST HEART RATE MONITORS FOR AEROBIC TRAINING

Before you begin to train your aerobic system, you’ll absolutely need to get your hands on a good heart rate monitor (see my article the ultimate guide to the best heart rate monitors) as a requirement. You need to see what’s going on with your heart rate so you can train within a heart rate range to see specific adaptions.

THE BEST

GARMIN FORERUNNER 235

There’s a ridiculous amount of devices on the market that will track your heart rate. The problem is that many of these devices are not very accurate or are designed more for people who want to send text notifications to their phone, rather than actually tracking their heart rate performance.
WHAT ARE THE CARDIOVASCULAR ADAPTIONS AND HOW WE TARGET EACH OF THESE

Now specifically, these adaptions can be specifically targeted and trained for through specific training methods discussed below.

OXYGEN SUPPLY TRAINING

These training methods will increase your aerobic fitness by increase the available oxygen in your blood by training the heart for better efficiency AND your muscles to take in more oxygen.

If you increase how much oxygen can be supplied TO the muscles or you how much oxygen can be utilized by the muscle fibers themselves, you will dramatically improve your aerobic fitness and thus your overall conditioning — both your overall fight endurance and your ability continually be explosive over and over without fatiguing.

Check Price on Amazon

POLAR FT7

I know a lot of you probably won't be willing to dump in 200-400 dollars for a top of the line heart rate monitor. So an alternative budget pick is the simple Polar FT7 with or without a chest strap (get the chest strap though because you can work on high intensity work that targets lactic and alactic energy systems). This device is about $60 bucks and it also includes a chest heart rate monitor strap for even more accurate measurements (but you can track with the watch heart rate sensor if you don't want to wear it).

This has everything you need to track and monitor your heart rate during a training session and on a budget price.

So for under $60, you can get everything you need to push your heart rate training to the next level, though you won't have all the fancy tracking, color graphics, smart phone syncing, long term data tracking via a companion app, 24/7 continuous heart rate tracking, and all the bells and whistles that the Garmin 235 gives. But again, it's under $60 bucks AND it also includes a chest strap so you can use it for high intensity training sessions as well.

Check Price on Amazon

THE BUDGET PICK

Let's get started then with the actual training. Much of this training requires the use of a heart rate monitor with a specific idea of how to use the device for this kind

CARDIOVASCULAR ADAPTATIONS THAT CONTRIBUTE TO AEROBIC FITNESS

When you talk about increasing your "cardio" you are primarily talking about increasing your body's oxygen uptake capabilities. The entire cardiovascular system is comprised of the heart, the network of arteries, the veins — all of these workings to distribute blood to the body.

To 'improve your cardio' you must improve the delivery of oxygen from the heart to the muscles and improve all associated metabolic processes responsible for transporting oxygen and delivering it to the muscle.

Now specifically, these adaptions can be specifically targeted and trained for through specific training methods discussed below.

WHAT ARE THE CARDIOVASCULAR ADAPTIONS AND HOW WE TARGET EACH OF THESE

There are a couple adaptions here we need to look at and understand the WHY before we talk about HOW:

1. Increase the body's ability to absorb and utilize oxygen for that level of work. If your body's ability to absorb and distribute oxygen to the muscles is increased, your fitness increases. This is trained by training for interval periods with your heart at its maximum rate (Vo2 Max).

2. Increase Heart Size: By increasing the muscular wall thickness (specifically the left ventricle), you increase the power of your heart contraction. By increasing the blood flow duration in the left ventricle, the internal dimensions expand allowing the heart to hold more blood.

3. Increase Heart Stroke Volume (amount of blood pumped per beat). When then muscle walls of the heart become thicker (allowing more contractility) and the left ventricle chamber expands to hold more blood, the amount of blood pulled into the heart and pushed out per heart beat increases. If your heart pushes harder per beat AND your heart chamber size increases, it also pushes more blood to your muscles, thus
4. Increased Cardiac Output: Increased Stroke Volume can make a significant difference in your total cardiac output when near your maximum heart rate. Because your increased in stroke volume which increases blood flow to your body, you have increased oxygen supply and waste removal abilities which lead to increased performance.

The Oxygen Supply Training protocols target your HEART adaptions.

1. CARDIAC VOLUME TRAINING (AKA ROAD WORK)

Cardiac Volume training (also called Cardiac Stroke Volume training) is the foundational training for almost all fight sports. It provides the aerobic base you need to power you through the energy requirements needed for Boxing, Muay Thai, Kickboxing, and MMA. This is not some 'new' training method fad. It's an established training regimen that's been around as long as there has been any sort of sport competition.

It's often called 'Road Work' by fighters.

And if you've never started conditioning work, chances are, you will want to START YOUR CONDITIONING WORKING ON THIS.

Roadwork is one of the foundational aerobic training methods (tried and true by virtually every sport) and it does so by increasing the efficiency of your heart.

Why?

It's quite simple: increase the blood flow output from your heart, you increase the amount of oxygen available to your working muscles. More oxygen means your muscle mitochondria can utilize it more readily to produce more ATP.

The following protocols will make those improvements. In some cases, if you have not done heart training, dramatic improvements which will absolutely over into improve stamina and energy during ALL aspects of your life.

This type of training basically means as you get fitter through road work / over-distance training, you can train at a higher intensity for a longer duration. Adding more time over time basically means you can sustain higher work rates. The effect of this is when you drop back down to lower times, you should be able to train at a higher intensity. For example, if you work your way up from 20-minute runs to 90 minute runs over time, your 20-minute max run time should improve (McArdle et. al., 1991, p.444).

CONTINUOUS SLOW STEADY STATE CARDIO (AKA ROADWORK) TRAINING PROTOCOLS

The Goal: To increase your stroke volume, you must increase the size of your left heart chamber so it can hold more blood and you need to increase the contractility of the left heart ventricle so it squeezes harder. The end result of this training will be a more efficient heart that pumps MORE blood per beat, giving your working muscles more oxygen to utilize for ATP production.

Training Method: You will need to do slow, steady state (uninterrupted) cardio activities that keep your heart beating at a threshold where blood is constantly filling the heart chamber and staying there long enough to force an adaption in the size of your heart by stretching it over time.

What it is: Continuous uninterrupted cardio that's at least 30 minutes in length several times a week with the intensity kept between 60 to 80 percent of your VO2 Max or your maximum heart rate.

WHY CARDIAC STROKE TRAINING IMPROVES YOUR AEROBIC FITNESS

There are two adaptions long duration training: heart adaptions and muscular adaptions.

Heart Adaption: When the heart rate is kept at an intensity of 60-80% of maximum oxygen capacity (i.e. VO2) and/or maximum heart rate, your left ventricle heart chamber will keep a continuous flow of blood inside. This promotes an adaption where the left ventricle walls stretch outward over time allowing more blood capacity. Roadwork also stimulates the production of MORE mitochondria in your muscle cells which increase your body's ability to handle the additional oxygen provided by your body's increased heart efficiency.

Muscular Adaption: Endurance training improves overall aerobic capacity (J Physiol 419-432). This is achieved by the following adaptions.

- Muscles gain increased capillary density. More capillaries mean more potential oxygen supply.
- Muscles gain an increase in the store of enzymes used to create aerobic energy (specifically the Krebs cycle).
- Increase in the number of mitochondria and the size of the mitochondria.
- Increased level of myoglobin (responsible for transporting oxygen from cell membrane to mitochondria).

HOW TO DO CARDIAC STROKE TRAINING

You can accomplish this by doing steady state cardio that keeps your heart rate between 130 Beats Per Minute to 150 beats per minute. You will want to do cardio work that's at least 30 minutes long, but preferably between 45 minutes to 90 minutes in length for maximum adaption stimulation. You'll likely need to buy a heart rate monitor to track your heart rate. You want to keep your heart between 130-150 bpm during the entire session or running, with no breaks. I recommend you run in the early morning or at night but not RIGHT BEFORE training as doing hour runs before hard training can tax your stamina. Make sure to keep adding time to your runs every couple weeks — the goal is to keep adding a bit more stress to your system slowly over time to see more and more improvements.

Exercise Specific Recommendations (as long as you keep to the time of 30-90 minute sessions at 130-150 bpm)

- Long slow runs
- Long skipping rope sessions
WHAT DOES CARDIAC POWER TRAINING DO FOR YOUR MUAY THAI

Training sessions designed to increase the strength and endurance properties of your heart. This works on your Aerobic Power but can also be used to increase your overall Aerobic Capacity too, depending.

And they suck. Bad. Be prepared for some serious pain while training your Vo2 Max.

What is Cardiac Power Training: Training at near max heart rate intensity between for 2 to 5-minute duration for several sets, once or twice a week. Note there are different strategies to train Vo2 Max. This strategy I give is geared specifically to improve your Cardiac Power output. Other methods people give may focus on different areas which could depending on rest times and durations, but used to improve Aerobic Capacity instead of Aerobic Power.

What is Your Vo2 Max: This is a measurement which basically has a long technical explanation. The short of it is that your Vo2 Max is your body’s maximum ability to utilize oxygen — that is, it’s overall ability to send oxygen to your muscles and the ability of the muscles to absorb and utilize that oxygen. This is THE best test for determining your overall Aerobic fitness.

A better Vo2 Max score means you are more fit (though you also need to look at your Vo2 Max and your max speed / output at your Vo2 Max to see how your Vo2 Max translates into actual work rate output).

As your supply more and more oxygen, your exercise intensity can continue to increase. Both rise at the same time: more overall oxygen supplied means more overall exercise intensity. But there reaches a point where your oxygen supply does not increase, yet your exercise intensity continues to. This point is your Vo2 Max. And by improving that score, your body’s ability to handle oxygen improves.

Increasing your Vo2 Max basically increases your body’s ability to supply and handle more oxygen which means increase intensity or, in other terms, more capacity for energy output.

WHY CARDIAC POWER TRAINING IMPROVES YOUR FITNESS

Vo2 Max training basically works on your heart and it’s ability to pump stronger.

Your heart is a muscle and as such can be trained to become stronger. As you’ve seen in the previous section that focuses on increasing the size of left heart ventricle chamber to improve stroke volume (i.e. how much blood it contains and can pump out per beat), the heart has adaptability properties depending on the type of stimulus applied over time.

With Cardiac Power Training, however, we are targeting a different adaption in the heart — specifically, the contractility adaptability of the heart. If you can increase how forcefully the heart squeezes, you can increase the blood flow output of the heart and thus increase the oxygen supply to the muscles.

Additionally, by forcing the heart to pump harder the heart muscle produces more mitochondria. This means the endurance properties of the heart increase; that is, the heart can beat at a higher rate for longer without itself fatiguing. This can lead to improvements in your work rate ability.

Having a strong heart that does not fatigue at higher heart rates with longer durations of intense activity means the heart can continually deliver a sustained blood flow for longer periods of time. More oxygen delivery capability means better cardio.

CARDIAC POWER TRAINING VS VO2 MAX TRAINING

To improve your aerobic capacity, the goal of all training should be to specifically bring your body to the point where it is consuming as much oxygen as it can then push it past that point to force an adaption so it can handle even more. As such, you are working your aerobic capacity by training at near max power outputs, but you are also working on a power component too since you are also forcing your body to supply as much ATP as quickly as possible to sustain that rate of work before tapping into aerobic metabolism.
In terms of Muay Thai, having stronger heart contractility (more blood per pump) and more mitochondria (more endurance at high heart rates) means if you are going balls to the wall trying to get the KO, or you are engaged in an all out clinch war and your heart is near its max, it will continue to keep contracting with maximum force, keeping your blood flow (and thus oxygen supply) steady enabling you to go all out balls to the wall for longer periods without fatiguing.

HOW TO DO CARDIAC POWER TRAINING

You can pretty much do any activity (sprinting, bag work, pad work, swimming, cycling, etc) you wish as long as you train at maximum intensity for a period of time with long rest periods of 1 to 2 minutes. Typically, when you start out, you will need longer break periods between reps. As your cardiac power improves, those break periods can be reduced since your heart rate will drop faster.

Keep the following training protocols in mind:

- 60 seconds to 120 seconds per rep
- 4 to 12 reps per session
- 1 to 2 sessions per week
- when you first start, start on the low end (60 seconds with fewer reps).
- Each week, increase either the duration (to a max of 2 minutes) or the number of reps to continue adaption.
- Rest between each rep 2 to 4 minutes OR using a heart rate monitor, when your heart rate is around 130 bpm (the sign you are ready to go again).
- Keep in mind as the weeks go on and your heart strength and endurance increases, your heart rate will go down FASTER so you will need less time for breaks.

SPECIFIC TYPES OF TRAINING

Sample training sessions (choose TWO different ones to do per week or do the SAME one twice a week). Remember to either increase the duration (max of w minutes) or the number or reps with each week to keep your heart adaptions continuing:

- Bag Work: 2 minutes x 5, one or two sessions a week OR...
- Long Sprints: 1 minutes x 10 OR 2 minutes x 5, one or two sessions a week OR.
- Pad Work: 2 minutes x 3, one or two sessions a week

Notes: The key to improving your Vo2 Max is that you need to train at near maximal intensities (your max heart rate) for an extended duration — those duration being 1 to 3 minutes. Training at this intensity is what forces those positive adaptions in both your heart.

OXYGEN UTILIZATION TRAINING

Unlike the other methods given, Oxygen Utilization Training training helps increase your muscles' oxygen uptake ability (oxygen utilization). This is due to a number of adaptations such as increasing the number of mitochondria in the muscle fibers, the efficiency of the current mitochondria in slow and fast twitch muscle fibers, the number of enzymes available for aerobic metabolism, and increasing the size of the slow twitch muscle fibers.

3. ANAEROBIC THRESHOLD TRAINING

This increases your overall aerobic power

By pushing the lactate threshold higher (the boundary where the aerobic energy switches to anaerobic energy), we can increase the rate of aerobic energy production. This is essentially Aerobic Power Training — we are trying to increase the maximum power output of aerobic metabolism.

In layman's terms, we are increasing the rate of ATP produced by the muscles WHILE only using the aerobic energy system. Remember, ATP is produced at its fastest when anaerobic metabolism occurs (the alactic or lactic systems). We are essentially trying to increase the aerobic energy system to be more efficient. More efficient supply of energy aerobically means less contribution from the quickly fatiguing anaerobic system which means more sustained power.

WHAT IS ANAEROBIC THRESHOLD TRAINING

Doing interval training where your heart rate is at or near your Anaerobic Threshold point between 60 to 120-second duration.

Note don't confuse Anaerobic Threshold Training with Vo2 Max Training above. Both work different things. Vo2 Max training has you training for 1 to 2 minutes near max heart rates (95 - 100 percent of your max heart rate) while Anerobic Threshold training has you training at your anaerobic threshold heart rate, which is submaximal heart rate.

Let's look at how your lactate threshold plays out in a real world example.
Make sure your heart rate is at or near your anaerobic threshold level for the activity. If you choose running as your Anaerobic/Lactate Threshold Training, something like this:

You will gradually increase either the duration from week to week or the number of sets to keep improving your AT.

Typically to do threshold training you will do 3 minute to 8 minute submaximal intervals for 3 to 5 reps. For every interval, keep your heart rate at or

**WHY ANAEROBIC THRESHOLD TRAINING IMPROVES YOUR AEROBIC FITNESS**

The aerobic system has the incredible capacity to supply continuous energy for long durations. However, when activity is greatly increased the aerobic system cannot meet the needs of the body’s energy requirements (that is, aerobic metabolism can’t produce ATP rapidly enough to meet the energy demands). It is at this point the body switches over to Anaerobic metabolism (Anaerobic Energy system).

It is this point where the body switches from Aerobic to Anaerobic metabolism that’s called the Anaerobic Threshold. However, Anaerobic metabolism can only provide continuous energy for about a minute before fatigue sets in which means, if possible, you want to avoid utilizing it and get most of your energy from the Aerobic system.

So it is the adaptability of this threshold point between Aerobic and Aerobic energy that we can target and subsequently, increase.

The variance of the AT can be quite high, depending on how trained the person is.

Untrained persons typically have a low AT (about 55 % of the VO2 max) while elite endurance athletes, at the other end of the spectrum, have a high AT (about 89 to 90 % of the VO2 max). Remember, the maximal heart rate is often closely aligned with the VO2 max (but not always).

This explains why a marathon runner can run for very long distances at a high-speed for hours: their AT threshold is so high they are able to generate far more power and speed at a high heart rate only using the aerobic metabolism while someone who does not have a high AT threshold could not sustain such a fast pace with a high heart rate without dipping into anaerobic metabolism for energy (and thus fatigue in only a couple minutes).

Also, note they are able to run for long periods of time at their VO2 Max!

So, it’s possible with training to raise this Anaerobic threshold point higher so you can power your greater energy with only aerobic metabolism by increasing aerobic metabolic efficiency. When you train consistently near your AT, your body will improve the muscular contractile properties AND the total number of enzymes involved in the aerobic process will increase.

That is, if you can increase your work rate while still only using the aerobic energy system (and not having to tap into the anaerobic energy), you can sustain longer periods of your work rate without fatigue.

**WHAT DOES THRESHOLD TRAINING DO FOR YOUR MUAY THAI**

There are three athletes here who run for 45 minutes. You’ll note with the blue graph, this athlete hits the 12 km/h pace and his lactate levels start to increase steadily. The faster the pace, the higher the levels. The last 15 minutes show a sharp increase. The increase in lactate indicates this athlete after 20 minutes and at the 12km pace is starting to utilize anaerobic energy.

The red line shows an athlete with a higher lactate threshold. Blood lactate starts to increase after 30 minutes and with a 13 km pace, but also not that even the last 15 minutes the level of lactate increase does not rise past a certain point.

The purple shows the athlete with the highest lactate threshold. Lactate levels only rise slightly after the 30-minute mark but maintain steadily for the last 15 minutes. This means this athlete is able to increase intensity (faster run) for a long period of time without utilizing aerobic energy. As such, he/she is able to sustain a faster pace for longer.

The end result of this kind of training is that you will raise your anaerobic power. This will mean you can do more powerful activities (such as striking with power) for longer periods with a higher heart without fatiguing. This translates into a higher work at a higher level of intensity (during sparring or fighting) without fatiguing (i.e. striking at submaximal power that’s near or at your raised threshold level).

SEE ALSO: **CoQ10 (Ubiquinol) Supplement Guide for Athletes: Does It Work?**

**WHY ANAEROBIC THRESHOLD TRAINING DO FOR YOUR MUAY THAI**

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**HOW TRAIN YOUR ANAEROBIC THRESHOLD**

You can use any exercise that that brings your heart rate to or near your anaerobic threshold for longer durations of. You don’t have to hit your AT exactly — you can be slightly over or under by a few hear beats per minute.

**HOW TO FIND ANAEROBIC THRESHOLD LEVEL**

You will need to first find your Anaerobic Threshold level before you can train at the right intensity to increase it.

To do so, use a heart rate to find your Maximum Heart Rate. You can do this by running a 60 second lap as fast as possible and track how high your heart rate goes (your maximal). This figure will be your Maximum Heart Rate.

Once you have this, figure your Anaerobic threshold will be between 80-90 percent of that (some people use 85 percent of max heart rate). This will give you a good guess estimate for your anaerobic threshold.

**THE TRAINING PROTOCOLS**

Typically to do threshold training you will do 3 minute to 8 minute submaximal intervals for 3 to 5 reps. For every interval, keep your heart rate at or slightly below your AT.

The type of activity can be anything, from running to skipping to bag work or other combat drills.

You must keep your workout durations between 3 and 10 minutes per rep, with 3 to 5 sets with 2-3 minutes rest between each exercise. Make sure you are using a hear rate monitor to track your heart rate during your activity and your heart rate is at or slightly under your anaerobic threshold level (+ or – about 5 heart beats per minute) is NEAR or at your AT level for the entire duration of the activity.

You will gradually increase either the duration from week to week or the number of sets to keep improving your AT.

If you choose running as your Anaerobic/Lactate Threshold Training, something like this:

- 5 x 750 meters with 3 minutes rest in between OR
- 4 x 1000 meters with 3–4 minutes rest OR
- 4–5 x 5 minutes with 4 minutes rest OR
- 5 x 4 minutes with 4 minutes rest OR

Make sure your heart rate is at or near your anaerobic threshold level for the activity.
4. AEROBIC SLOW TWITCH MUSCLE FIBER TRAINING (AKA STRENGTH TRAINING)

Improves aerobic power AND anaerobic power potential

Strength training, besides increasing your strength (which plays a role in how much potential POWER you can generate when striking (9, 10, 11)), increases your overall muscle fiber coordination, can also improve your endurance because of biological changes to the muscle fibers that occur.

WHY STRENGTH TRAINING FOR ENDURANCE INCREASES YOUR AEROBIC FITNESS

Slow twitch muscles are primarily aerobic in nature and as such have the greatest capability of increasing oxygen absorption efficiency.

The idea here is to increase the size of the slow twitch muscle fibers which will improve their lactate removing properties (slow twitch muscle fibers are where lactate is oxidized and made into ATP).

Making your slow twitch muscle fibers longer increases the surface area which also will increase how much oxygen they can utilize because as the muscle fibers get longer, they also get more mitochondria — the cell engine that takes in oxygen and produces ATP.

There have been a number of studies done that have shown strength training has improved cardiovascular fitness. A study in 2008 had trained runners perform a heavy strength training routine for 8 weeks and found after 8 weeks the subjects' Running Economy (Vo2 at steady state rate) improved as had their time till exhaustion while running at their aerobic max.

Now in Muay Thai, you utilize fast twitch muscle fibers for quick muscular activities (punching, kicking, throws, elbows), but slow twitch muscle fibers play a very important role in removing waste materials and resupplying materials needed for aerobic metabolism.

So there are biological benefits to having longer slow twitch fibers which can actually improve your cardio capabilities by making the muscles' utilization of oxygen more efficient.

THE TRAINING PROTOCOL

Use Compound Exercises like deadlifts, squats, bench press, and overhead press. If you want a specific routine look at my Strength Training for Muay Thai routine which will work on this while focusing on strength.

Keep reps between 5 to 10 with 3-5 exercises per session.

If you are lifting to build strength, you should lift 2-3 times a week with heavier weight and at the lower end of the rep range (5-6 reps).

If you are working on just trying to improve muscular endurance not strength, then lifting once a week is enough.

5. RESISTANCE INTERVAL TRAINING (AEROBIC FAST TWITCH MUSCLE TRAINING)

Increases Aerobic Power

'Short highly intensive training which at which high resistance is applied to recruit fast twitch muscle fibers for a low duration of time (10 to 15-second intervals) while in the anaerobic state.'

WHY RESISTANCE INTERVAL TRAINING IMPROVES YOUR AEROBIC FITNESS

Unlike the other aerobic exercise above (Strength Training with targets the slow twitch muscle fibers, the resistance training recruits your fast twitch muscle fibers you are going are using your explosive power for 10-12 seconds while still using your aerobic energy system for that duration because you will be under your anaerobic threshold) and works on improving your body's ability to supply constant oxygen to them via aerobic metabolism; this happens because your fast twitch muscle fibers oxidative properties can be increased by producing more mitochondria.

This improves the aerobic properties of your slow twitch fibers. While it's typically slow twitch fibers that are more aerobic in nature than fast twitch, you can still improve the oxygen supply and utilization of fast twitch fibers.

And we can stimulate this adaption to occur specifically by keeping recruiting your fast twitch muscle fibers while in a state of aerobic metabolism for short periods, over and over.

WHAT RESISTANCE INTERVAL TRAINING DOES FOR YOUR MUAY THAI

By increasing resistance while using lower speed, this training method stimulates your fast twitch muscles to develop more mitochondria, thus...
Lower Body Exercises:

You should increase set duration. Every 4 weeks you can decrease rest period by 5 seconds. You'll want to do 10 or so movements with a rest of 10 to 30 seconds between before continuing. The duration should be between 5 to 12 minutes and each exercise taxing. If this is the case, stick with more low intensity, less strength driven plyometrics such as medicine ball rebounds or tosses.

Upper Body Plyometrics:

For the upper body plyometrics, if you don't have a strong strength base, you may find explosive pushups and the Smith Machine BP Throws too taxing. If this is the case, stick with medicine ball rebounds or tosses.

The end result is your muscles can operate at a higher power threshold without getting fatigued. So for any activity that uses fast twitch muscles (clinching, throwing your opponent, punching, kicking), you can increase the muscular endurance.

Remember, while we can make overall adaptations to your heart, we also want your muscles that perform the actual skill movements to have more efficiency in their supply of ATP while in the aerobic state.

In layman's terms, you can be more explosive for longer periods of time without your muscles feeling tired. And if your aerobic supply has increased (due to higher stroke volume and a stronger heart), your fast twitch muscle fibers are able to take advantage of the increased oxygen supply because there are MORE mitochondria to utilize the increased O2 present.

HOW TO DO HIGH RESISTANCE TRAINING (THE TRAINING PROTOCOLS)

Perform an intensive activity that applies a lot of resistance to your muscles for a short duration (to keep your body in aerobic state). The easiest exercise is to do hill sprints up a very steep hill so even at maximum speed. Other training options are to use a spin cycle or a weighted sled.

Pretty much any exercise that forces you to recruit a large amount of fast twitch muscle fibers under constant tension while keeping yourself in the aerobic energy state can be used.

This training requires a good deal from your aerobic energy system. Without a good aerobic base, you won't be able to recover between each rep.

As your aerobic system gets better (which is why you should also be building up your overall aerobic fitness base through stroke volume training and cardiac power training), you will be able to repeatedly sprint with less and less time for breaks while still having energy.

Keep the following training protocols in mind:

- Keep your reps between 7 to 12 seconds, 6 to 20 reps per session, once a week
- Rest for about one minute or, using a heart rate monitor, until your heart rate is between 130 and 140 beats per minute before starting the next rep
- Increase the number of reps each week by 2. You will notice as your fast twitch muscles gain more oxidative properties, your heart rate will go down faster between each rep AND you will be able to do more reps before fatiguing

Example: 2 months hill sprints Training:

- Week 1: 7 seconds for 6 reps. 1 minute between each set for recovery
- Week 2: 8 seconds for 7 reps. 1 minute between each set for recovery
- Week 3: 9 seconds for 8 reps. 45 seconds between each set for recovery
- Week 4: 10 seconds for 10 reps. 45 seconds between each set for recovery
- Week 5: 10 seconds for 12 reps. 40 seconds between each set for recovery
- Week 6: 12 seconds for 14 reps. 40 seconds between each set for recovery
- Week 7: 12 seconds for 16 reps. 35 seconds between each set for recovery
- Week 8: 12 seconds for 18 reps. 30 seconds between each set for recovery

AEROBIC PLYOMETRICS

Plyometrics are in vogue now and surprisingly effective, when used at the right intensity and for the right duration, at improving your fast twitch muscle aerobic properties.

The better your fast twitch muscles are at uptaking oxygen, the more endurance your muscles will have when you use them explosively. This increases your explosive endurance.

HOW PLYOMETRICS WORK

Plyometrics work by forcing your muscle fibers to stretch thus giving the ‘rebound’ contraction of the fiber more force. You can perform plyometrics aerobically but done correctly utilizing your fast twitch muscle fibers.

It sounds a bit odd, but there's a lot of research behind this rebound effect and how effective it is when applied to strength & conditioning training. Specifically, plyometrics can be used to help tune your muscles to generate more overall power (training to move force more quickly and explosively).

The key here, to make plyometrics work for aerobic adaptations in your muscles is to perform them with long duration with a low intensity. This keeps things aerobic and works that energy system, NOT the anaerobic system, which requires more explosive plyometric, circuit type work.

HOW TO DO AEROBIC PLYOMETRICS

There are a number of exercises that can be used as a plyometric and pretty much any such can be used as long as a) it's recruiting fast-twitch muscle fibers (the exercise is explosive in nature), b) you keep the total duration between 4 and 11 minutes per set, each exercise in a set a repetitive movement 5-10 times, c) keep rest periods between 12 and 15 seconds, d) you increase either the duration of the set OR increase the number of sets.

TRAINING PROTOCOL

Remember, you are specifically increasing the aerobic properties of the fast twitch muscles being utilized in the plyometric movement, so you'll need to target legs or arms separately.

Upper Body Exercises:

- Medicine Ball Rebounds
- Wind-up Tosses To The Side
- Explosive Pushups
- Iso-balkistic Smith Machine Bench Press Throws

For the upper body plyometrics, if you don't have a strong strength base, you may find explosive pushups and the Smith Machine BP Throws too taxing. If this is the case, stick with medicine ball rebounds or tosses.

You'll want to do 10 or so movements with a rest of 10 to 30 seconds between before continuing. The duration should be between 5 to 12 minutes and each week you should increase set duration. Every 4 weeks you can decrease rest period by 5 seconds.

Lower Body Exercises:

- Jump Squats
- Box Jumps
Aerobic system and will fatigue quickly. These systems are more efficient than the anaerobic energy systems.

The two anaerobic energy systems are able to supply a much more rapid production of ATP anaerobically when your body demands it for intensive activity — that rapid power that lets you go for a knockout blow when you need to. However, these systems are more inefficient than the aerobic system.

So Anaerobic energy is also very important, especially when it comes to short-term energy — getting that quick KO or going balls to the walls for as long as possible.

As important as the Aerobic System is at giving your body a foundational fitness and it’s beneficial effect on your anaerobic energy systems, there is also an effect your anaerobic capacity has on your aerobic power too. Specifically, better anaerobic capacity can give you better aerobic power (the ability to utilize more energy aerobically while near your anaerobic threshold — that is while at your max aerobic energy output).

WHAT'S AFTER AEROBIC FITNESS?

Having good aerobic fitness is only the first part of the conditioning equation. A highly efficient aerobic system will give you the endurance to go for five rounds and recover between bursts of intense activity with a strong aerobic base.

But.

For more explosive endurance (how long you can sustain an explosive burst of energy) and increased power (the amount of force you can apply as a rapid power), you will need to train the anaerobic energy systems. These are the two energy systems that are responsible for both your short-term maximal explosive power and longer duration sub maximal explosive power.

As important as the Aerobic System is at giving your body a foundational fitness and it’s beneficial effect on your anaerobic energy systems, there is also an effect your anaerobic capacity has on your aerobic power too. Specifically, better anaerobic capacity can give you better aerobic power (the ability to utilize more energy aerobically while near your anaerobic threshold — that is while at your max aerobic energy output).

So Anaerobic energy is also very important, especially when it comes to short-term energy — getting that quick KO or going balls to the walls for as long as possible.

The two anaerobic energy systems are able to supply a much more rapid production of ATP anaerobically when your body demands it for intensive bouts of activity — that rapid power that lets you go for a knockout blow when you need to. However, these systems are more inefficient than the aerobic system and will fatigue quickly.

PUTTING IT ALL TOGETHER

We've covered a huge range of training strategies — all with the single goal of improving your anaerobic fitness.

Note: There are more training protocols out there and there's a LOT of variety as to how you can mix each one up. I've simply provided a basic guide — you can certainly optimize and change things around in time.

Developing a strong aerobic base should be the first thing you do to improve your conditioning. If you have low endurance during training or stamina problems during sparring or fights, and you don't do aerobic conditioning, then you will see some vast improvements by working on these conditioning exercises.

I've laid out some specific training guides that target components of the aerobic conditioning: power, capacity, strength. Each training type will improve something specific. And taken as a whole these can improve your entire aerobic base.

It takes time for your body to adapt — weeks and months. This is why, to see regular improvements, you must be consistent with your conditioning work. You can start say a cardiac stroke training segment for 1 week and expect to see your cardiac shot through the roof. Ideally, you are going to want to train in blocks of 2 months to 4 months to see real improvements, though if you just start conditioning work for the first time, you WILL see improvements in only a couple weeks.

Many of these training protocols require you to track your heart rate (for example, you can take your resting heart rate. If it's higher than about 55 bpm, you will likely benefit from steady state volume cardio work to build a more efficient heart).

Therefore, to take the guesswork out of the equation, if you are serious about improving your muay thai conditioning, you need to buy a quality heart rate monitor — ideally one with a chest strap for more accuracy. Any brand works, but I personally suggest you go with Polar which is an established heart rate monitor company. You can pick up a good model for about $70 to $100 bucks on Amazon.

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Having good aerobic fitness is only the first part of the conditioning equation. A highly efficient aerobic system will give you the endurance to go for five rounds and recover between bursts of intense activity with a strong aerobic base.

But.

For more explosive endurance (how long you can sustain an explosive burst of energy) and increased power (the amount of force you can apply as a duration of time), you need to train the two other energy systems as well, the anaerobic alactic system and the anaerobic lactic system.

These are the two energy systems that are responsible for both your short-term maximal explosive power and longer duration sub maximal explosive power.

As important as the Aerobic System is at giving your body a foundational fitness and it’s beneficial effect on your anaerobic energy systems, there is also an effect your anaerobic capacity has on your aerobic power too. Specifically, better anaerobic capacity can give you better aerobic power (the ability to utilize more energy aerobically while near your anaerobic threshold — that is while at your max aerobic energy output).

So Anaerobic energy is also very important, especially when it comes to short-term energy — getting that quick KO or going balls to the walls for as long as possible.

The two anaerobic energy systems are able to supply a much more rapid production of ATP anaerobically when your body demands it for intensive bouts of activity — that rapid power that lets you go for a knockout blow when you need to. However, these systems are more inefficient than the aerobic system and will fatigue quickly.
But with the right training, however, these anaerobic metabolic systems can be made more efficient, allowing you more explosive power for longer, sustained periods, over and over again.

Keep in mind though, your aerobic base impacts your anaerobic base too. A more conditioned aerobic system will allow quicker recovery for your anaerobic pathways.

Start reading my next conditioning article ‘How to Improve Conditioning through Heart Rate Training’ which covers exactly how to train with a heart rate monitor.

If you guys enjoyed this post and my other articles about strength training, conditioning, diet, and other such topics (with a few boxing and Muay Thai articles thrown in!), subscribe to my PERSONAL newsletter ‘Muay Thai Fit’.

The Muay Thai Fit newsletter is one that focuses mostly on strength & conditioning, diet, losing weight, and other such topics (but with a focus on how to apply them or combine them with Muay Thai).

I will be writing these articles just for the Muay Thai Fit newsletter...and ONLY people who subscribe to it (and not the general one only) will receive articles.

REFERENCES

8. Joel Jamison Ultimate MMA Conditioning
11. Andersen, JL; Schjerling, P; Saltin, B. Muscle, Genes and Athletic Performance. Scientific American. 9/2000

Also HIGHLY Recommended: Joel Jamison’s Ultimate MMA Conditioning & Various Lectures

Many of these principals I talk about and practice come from strength and conditioning research, coaches, and experts who are pushing the forefront of aerobic fitness. And for specific energy system influence, a lot of my ideas have been inspired by Joel Jamison’s influential work written years ago dealing with conditioning the energy systems. And credit goes to him for driving me deeper into the whole field of strength and conditioning as applied to the energy systems. Many of the ideas expressed here come specifically from his original perspectives and research. If you want a huge amount of depth looking at the energy systems and how to train them, you should read his book Ultimate MMA Conditioning. Though it targets MMA and not Muay Thai, the general principals can be adapted for Muay Thai or any other sport.
Hello Ben,

Thanks a lot for your guide it will be really helpful for my personal training, you did an amazing work.

Do you plan to write a guide about flexibility? I am tall, I grew up really fast and now I have a huge deficit with my flexibility. Flexibility is nevertheless really important for Muay Thai and really hard to improve.

Thanks in advance for you replay.

Woopssy

Ben on October 13, 2015 at 4:28 am

It's a topic for a future article. There are definitely some big advantages to being flexible especially when it comes to head kicks you can deliver while standing very close to your opponent. I can write something about the topic in the future.

Something like Yoga would definitely help improve your flexibility or you can work specifically on your own on stretches to loosen up your hips and tendons. In time you can improve your flexibility with kicks.

Marc on November 12, 2015 at 2:51 am

Really great article! Hope to see more of these soon. In relation to conditioning, I do have a few observations:

1. From experience, I think the best way to do conditioning is to make it as similar as possible to how you will actually perform in competition. Thus, the way most Thai boxers train is more effective than the HIIT circuits used elsewhere. The one advantage a HIIT circuit may have over an aerobic conditioning routine is that it can improve muscular endurance more effectively if the right type of exercises are chosen.

2. From what I understand HIIT is based on Tabata Method and lots of people use Tabata Method to justify HIIT. However, almost no one will execute HIIT as in Tabata Method because it is not technically possible in a lot of instances. Depending on the type of exercises chosen, a HIIT routine can be really exhausting or simply moderately tiring and I do see people trying to achieve their conditioning through roadwork and moderately tiring HIIT (lots of weights, high reps) alone. I really doubt the effectiveness of such an approach.

3. I had successfully mixed aerobic routine with HIIT before – roadwork for 30 mins once a week, conventional pad work for 5 rounds, bag work for 5 rounds, HIIT mitt work for 3 to 5 rounds as a warm up (non-stop punching for 3 minutes, 1 minute rest) and dumbbell circuits. After about 3 to 4 weeks of this type of workout, my friend was able to perform much better than those who did roadwork and long, lazy bag work every day. The only problem was that she didn't have the energy to execute the whole routine properly (she was on diet).

Ben on November 15, 2015 at 3:24 am

Thanks for the comment mate — glad you like the article. I spent weeks writing it, then thought it might be a bit too technical and complicated for most people to follow along with!

There are a LOT of different paths to fitness and of course, the huge variation in individual responses to certain types of training also makes a difference.

I agree completely — to derive the biggest conditioning benefits, you must eventually tune your workouts to sport-specific movements. This helps increase the efficiency of those specific motor movements and the metabolic processes to produce those movements. Basically, your fitness improves for that specific type of movement / activity pattern related to your sport. You can do a lot of skill exercises (bag work, pad work, sparring) using the targeted times and heart rates levels to achieve some of this.

For aerobic fitness, the biggest benefits are to the heart and cardiovascular fitness. I like to think of this as your 'base'. If your base sucks, everything else will be less than optimal. But once you build your base up to a good enough level, you can look at specializing (short term explosive training – alactic training, lactic training, and so on).

ONLY doing something like roadwork, while you can perhaps 'get by' in terms of building up a good level of stamina and conditioning, is not the best approach. You will also want to eventually work on some of the other energy systems which will provide you with a more well
rounding fitness.

Cheers

Ben

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Ivan on December 23, 2015 at 1:36 pm

Great article!

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Ash on January 4, 2016 at 7:33 pm

What a great article Ben! Thanks for your insight, you've gained a fan.

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JS on February 17, 2016 at 11:20 pm

Amazing piece. Just happened to found your site and it's awesome. I'll be checking it often. Thanks.

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Johnny Brown on September 12, 2016 at 8:51 am

Hi Ben, I love your in depth article and I'll be using most of it daily! Though, I'm confused on whether I can train every day without getting injuries.

On Monday, Wednesday and Friday I got training from my trainer which is mostly technique but sometimes, quite often actually, he mixes in, not-too-tough conditioning training — which is still quite intensive for an untrained person, — and on Thursday we have Vo2 Max Cardiac training, like 1 minute hitting the bag as intensive as possible then 1 minute rest, some shin hardening and more bag work.

Now the question is can I add your training programs to it during the morning when I have a lot of free time? When do I overtrain? Do I need rest days? Which programs can I train daily and which ones need a rest day?

Thanks in advance Ben!

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Ben on September 13, 2016 at 4:24 am

Glad you like it might! 😊

1) training every day requires you to build up your endurance. This takes time. You can't start training 5-6 days a week, packing everything in, right away. It takes months before you can handle this load.

2) You can add in training in the morning (I recommend this because you get the rest of the day to rest).

3) When you are overtrained, you will feel it — trust me. no energy, no endurance, sore all over.

4) You absolutely need rest days. I recommend 2 rest days of a week. What works for me is taking thursday off and sunday off. This provides a break in between training. This being if you have a monday to saturday training option.

Another method is to train monday to friday, but take two full days off — saturday to sunday. The 2 days ads a nice buffer for even more recovery. But if you take 2 days off and this means you train 5 days straight, you may find yourself getting worn out after 3 days of training, especially if you train twice a day.
What you can do then is to rotate between 'high intensity' and low intensity days. Monday = high intensity, Tuesday = low intensity, Wednesday = high intensity, Thursday = low intensity, Friday = high intensity. Then 2 days of rest.

This allows you to train every day but still provides a way for your body to 'recover' even during training.

Hope that helps!

Ben

Sea richard on January 8, 2017 at 6:01 am

Would fast/speed walking count for long slow cardio training or does it have to be running

Ben on January 8, 2017 at 6:28 pm

Speed walking might work. Walking, no.

Any activity as long as it keeps your heart rate between 130 to 150 Bpm. Skipping, running, cycling — these can all work, but you can certainly do other activities like low intensity bag work, shadowboxing, etc.

Wayne on March 3, 2017 at 1:20 am

Hi Ben,

GREAT GREAT ARTICLE!

I've just started my 3rd month of MT training, which is about 3 – 4 times a week right now. I'm just wondering if you can give me some advice on how i can throw in some conditioning session into my schedule.

Usually i'm training M/W/TH/F at noon. Do you think if i run in the morning on the days i train MT and weight lifting on Tue and Sat will be feasible? or should i train and run on M/W/F and do weight lifting on T/Th/S? Which will be more beneficial to me?

Thanks in advance!

Ben on March 3, 2017 at 6:28 pm

Good news for you is I have my new conditioning series (starting with...http://muaythaiat.com/ultimate-guide-to-heart-rate-training-how-to-use-a-heart-rate-monitor/) which will give very detailed guides on how to go about it.

I recommend doing your strength training sessions (2x a week or 3x a week if you can manage) 3-8 hours before you do your MT training. I typically leave off my Deadlifts & Squats to the end of the week (Friday or Saturday with SUNDAY off). These lifts are so taxing on your CNS (Central Nervous System) that they can really interfere with your stamina and strength during your MT training sessions. I find it takes me a good 2 days to recover from a hard deadlifting & squat day. So doing them near the end of the week won't mess up your MT training during the week. The other lifts (Bench Press, Military Press, core work, etc) you can do on other days as you see fit. Just try to do them 4-8 hours BEFORE training, or in a pinch, after training, though if you do it right after, your strength will be down when you lift.

For conditioning, this depends on the TYPE of conditioning. In general I recommend do it a few hours before your training or AFTER or it will interfere with your training (you will be tired).

You can do steady state cardio work (slow runs / skipping / long duration shadowboxing or bag work) AFTER training. You can also do it before training, but I prefer after. Alternatively, you can do this in the early morning to get it out of the way (this is the best method since it's done and you have the full day to recover and can do training).
For intense conditioning work — working on aerobic power output (lactate threshold work, VO2 max work) or anaerobic conditioning — you’ll be best off doing these either AFTER training sessions (but be prepared to be brutally tired) or 4-8 hours before your training. You’ll have to find what works best for you and your schedual. I will say that doing a 30 minute lactate threshold run right before training won’t lead to a good MT training sessions right after.

I’ll be having an article specifically that touches on planning your conditioning work out with your training over the next month.

Best,
Ben

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Jordan Jeffries on March 29, 2017 at 12:41 am
What a wealth of knowledge i cannot wait to apply it. I recently completed for an Australian amateur muay thai championship against a fighter with more than 3 times the experience. Was going well and comfortably ahead till mid 4th round as I started to slow down he picked up the pace and ran away with a finish at the end of the round. We were fighting at a high pace already but its now my life’s goal to improve my cardio as much as I can and with all this knowledge I will do just that. Thanks heaps my man!

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Terry Leighton on April 26, 2017 at 7:31 pm
What a great read. I just finished all 3 parts and it’s really helped me understand more! Would you be interested in writing out an 8 week program for me and I will pay you. I have a Muay Thai fight on Saturday, 2nd one, and have been training my arse off, long runs, swimming, sprints, pads, shadow, bag, skipping, footwork, bodyweight, everything. I have another fight lined up in 9 weeks from now so it would be good to to have a program all set up to work all the energy systems. I think I can go for ages as my anaerobic I think is good(I'm a postman) but still can gas out so feel need to work the others. Can you help?

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Ben on April 29, 2017 at 5:04 pm
Hi — the problem with these training programs is they take a customized approach. It's no good to write a generalized training program as every person responds to different sorts of training. You have to do some conditioning tests (see my post about tracking conditioning) and have to determine what energy systems need to be improved.

Do you have a lot of endurance but lack explosive knockout power?
Do you have a lot of power, but gas out quickly?

IN general, I always say start out with improving your aerobic base first because this is linked to the other two systems and having strong aerobic fitness improves your training capacity, your recovery ability (by increasing your parasympathetic nervous system response), and improves your anaerobic fitness as well (both lactic system and alactic systems).

If your aerobic system is already strong through aerobic training sessions (you can get test how much so and get some actual data by doing a resting heart rate test, a lactic threshold test on the treadmill, and a 1.5 mile cooper run test, looking at your HRV with a heart rate monitor & an HRV app like bioforce or iThlete), then you would want to focus on the more explosive power side of things: improving lactic threshold, improving lactic & alactic capacity, improve the rate of energy supply for lactic & alactic systems.

I can't easy guide you with these as there is a lot of hands on. I can point you to some literature that will give you a good idea how to self-coach yourself, one that will give you a good 8-week plan to follow, but as your own coach.

Best,
Ben
Aaron on February 8, 2018 at 4:18 pm

Would you recommend just focusing on just one of the areas as a new trainee, or multiple?

Eugene on January 5, 2019 at 2:20 pm

Great Article!

Can you please explain me which training I can combine together and which are not recommended? For example, I think to combine: Strength training + Polymetrics after. Which can I combine of these 3 : Vo2 max, cardiac volume, anaerobic treshold? Or it is better to train them separately?

Also can you please refer me to a good articles about the other 2 systems you didn't mentioned? Anaerobic lactic and alactic with trainings examples (Not necessarily for mui tai).

Can I train these 2 along with aerobic trainings? Or is it better to build a good aerobic base first?

Thank you!
WARNING

READER MAY ACTUALLY LEARN SOMETHING IN THIS POST
High intensity efforts, after all, are an instant barometer of how well they have been training to date, and as a result swimmers will intentionally biff the effort, or play down expectations to avoid feeling disappointed. With no clock on them, swimmers can let it fly without worrying that they are matching or exceeding their personal practice best times. Fartlek training: You'll lose count less often! Helps you develop gear changing ability. Fartlek swimming is awesome for teaching you to switch gears at a moment's notice, and this can come in pretty handy. Often times in your middle distance...