

The Truth About Cardio Programming

By Paul Robbins

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There are three main components of an effective weight loss program: Proper diet, effective weight training and a complete cardiovascular program. You can find hundreds of books on diets and weight loss plans in any bookstore. You will also find dozens of books on weight training. However, few books in the mainstream media provide information about proper cardiovascular training.

This article will help personal trainers and group fitness instructors understand the true benefits of cardiovascular training. Coming from a career in the fitness business and seeing a lot of frustrated club members, my goal is to educate you on how to get the most out of every cardiovascular workout. I will address the myth of those "fat-burning zones" and help you to design a cardiovascular program.

The "Fat Burning Zone" Myth

What is the "fat burning zone?" It's the time when your body is mainly using fat as fuel. This can be determined using a metabolic analyzer to measure an individual's respiratory exchange ratio-RER. Simply put, this is the amount of carbon dioxide (CO₂) you expire, divided by the oxygen (O₂) you inhale while you breathe. Your body uses the highest percent of its fuel from fat when the body has a RER of .71.

So, you may ask, if your body wants to use a high percent of its fuel from fat when you are at .71 RER, why wouldn't you want to exercise at this level all the time? Because the only time your body can be at .71 RER is at **complete rest**. This is where the real fat burning zone theory breaks down, because you simply don't burn very many calories when resting. As you increase your activity level, your RER will rise.

Some fitness professionals designate your "fat burning zone" somewhere between an RER of .80-.90, (also referred as 65% of max heart rate) and you could still be using some fat as a fuel but you are now doing moderate exercise such as a fast walk or light jog. But more importantly, you are now also burning a fair amount of calories. This is a great zone to start in and I consistently use it for beginners to improve their blood's capability to deliver oxygen throughout the body and remove waste. When you exercise regularly, your body increases its output of blood and your blood volume increases – this allows more blood to get to the cells. The result is a greater flow of oxygen to a greater number of cells throughout the body, thus helping the cells work to their capacity and allowing the heart to become stronger.

From this point on we will refer to this RER of .80-.90 as **zone one**. Even though many people know this as the "fat burning zone," we will refer to it as more of a "recovery zone" – which it truly is. Later I will discuss a beginner stage-training program that illustrates how to design programs using three different zones. The problem with using only zone one is that you will hit a plateau and not be able to increase your fitness level. As a result, your weight will remain the same. (I've witnessed this phenomenon in about half of my clients.)

The other half of my clients are doing what they think is a high-intensity workout every time they use a piece of fitness equipment or attend an aerobic class. These people are usually at an RER of around 1.0 (or 85% of max heart rate), which I will refer to this as **zone two**. This is near your anaerobic threshold – when your body can no longer produce enough energy for the muscles with just your oxygen intake. Unlike zone one, which is strictly aerobic training, with the presence of oxygen. The higher the intensity you train and still stay aerobic, results in more calories burned with a high percent of the calories coming from fat. That is why one of the main goals of cardiovascular training is to increase your anaerobic threshold. Anaerobic threshold also occurs when your body can no longer remove all of the lactic acid it's producing in the muscles. This collection of the extra lactic acid is what you feel at the end of your interval or workout.

This RER of 1.0 utilizes nearly all carbohydrates for fuel, but you burn more calories. Because this is the most important issue, these people are on the right track. **The bottom line in winning the weight loss game is that you have to burn more calories than you consume.** But staying in zone two all the time will also cause you to hit a plateau. I see it all the time – people doing six, seven and eight aerobic classes a week without losing any weight. The reason is simple: **To improve your fitness level or increase your metabolism, you must overload the body. If you do the same level of exercise during every workout, your body will never recover enough to do an overload workout and will also never do a true "high intensity" workout.** A true high intensity workout would be going to a RER of 1.1 (now up to 90% of max heart rate, or a sub-max VO₂ for short sprints. This is called "overloading," and it means taking someone to their peak (**zone three**) for 30 to 60 seconds before recovering in zone one and going back to zone three.

For most clients, going to this level once a week is enough. Studies show that training at high intensity once a week or three times a week both have the same cardiovascular conditioning benefits. If weight loss is your goal, then you might train in zone three more often to help burn more calories and raise your metabolism. However, I caution you to not spend too much time in zone three, which can lead to over-training.

Benefits of Interval Training: Overloading

Overloading is necessary if your goal is to bring positive physical changes to your cardiovascular system – the body must be presented with a workload that challenges its current fitness state. This workload will cause fatigue, and with the proper recovery, will eventually yield cardiovascular improvements. If the workloads are of the right magnitude – slightly more than the body is currently used to – then adaptation occurs. It is important to note that the overload happens during the exercise, while the adaptations occurs during recovery – thus making recovery a vital part of your program.

An average 150-pound person training only in zone one will burn around 82 calories during a 30-minute bike ride, with half of those calories able to come from fat. As this same person bikes at a harder rate, or does aerobic class for the same period of time, they will raise their RER to around 1.0 in zone two and burn up to 152 calories. But, only a small percentage might come from fat. The most effective workout is one that involves "interval training." This means starting in the zone one RER .85 ("fat burning"), then slowly working their way through zone two RER 1.0 ("anaerobic threshold") until they hit their zone three RER 1.1("peak"). In this workout, the exerciser ends up burning more calories and possibly more fat calories. The same 150 lb. person doing intervals would then burn 173, and a possible increase in the amount of fat calories burned by 50.

There are three other very important benefits of interval training. The first is simply the motivational factor that occurs when you start designing your workouts, the programs are always changing. In addition, the exerciser's cardiovascular system is increased. By overloading the heart and lungs, you are increasing your endurance and cardiovascular fitness level, which is the same principle as weight training (overloading the biceps will result in increasing the biceps strength). The heart is a muscle, so it must be overloaded to improve its strength. At the same time, the rest of the respiratory system is improving, including the lungs and blood circulation, for better endurance.

The most important benefit of interval training is an increase in the metabolism. The "Truth About Burning Fat" is not how much you burn during your workout, but what your body is doing during the rest of the day. Studies have shown that interval training raises your metabolism after a workout, and keeps it up longer than any "steady state" workout. Steady state exercise refers to any exercise that stays at the same workload for a long period of time, like an aerobic class or normal bike ride.

Finding Your Zones

To increase your fitness level is to overload your body by doing true intervals. We are going to use a three zones: Zone one "fat burning or recovery," zone two "anaerobic threshold" and zone three "peak," to design your cardio program. There are two ways to find these zones, which are measured by your heart rate. The first way is to use a metabolic analyzer to find your heart rate zones using CO₂ to O₂ measurements. Portable analyzers are now being used in many health clubs. The second way is to use an age prediction chart. This works well when you are just starting out, but it will need to be adjusted as your fitness level increases. The main zone that you will have to adjust will be the "peak." This is a heart rate that you can maintain for 30 to 60 seconds, and then recover back into the zone one "recovery zone" for 5-10 minutes before repeating.

Using HR formulas

To use the heart rate chart, take 220 minus your age then use 65% of that number for the "recovery zone"- zone one, 85% for the "anaerobic threshold"- zone two, and 90% for "peak"- zone three. *Caution: If you have any heart-related illness or if you are on any medication that might affect your heart rate, then please consult with your doctor for their recommended zones.*

Example: 40-year-old Adult
220-40= 180

Zone one: 180x 65% = 117 beats per minute heart rate

Zone two: 180x 85% = 153 beats per minute heart rate

Zone three: 180x 90% = 162 beats per minute heart rate

There are many other formulas that you can use, again the most reliable way of determining heart rate zones is using a metabolic analyzer. Once you have your three "zones" or heart rates, place them in the stage training charts at the end of this article. These three zones are the most important part of your program. Using a heart rate monitor will help you find your heart rate during exercise.

The peak number, obtained from the formula, should push you enough that the workout feels hard, but doesn't burn you out. After experimenting with the chart's heart rates for three to four workouts, and after feeling good both during the exercise and the next day, start making adjustments. Slowly add two to three beats to each zone. Then try the workouts three or four times before making additional adjustments. **Once you've have found a comfortable peak, the goal will be to slowly increase the time at peak, not increase the beats per minutes.**

Stage Training

We'll now work on designing workouts that insure that you're changing the workload (speed, incline, level, etc.) in a way that will help you go in and out of each zone. I have an example of the three stages for a 40-year-old beginner below. In this example, the exerciser uses a treadmill, with the most important factor being the change in heart rate. At this point, it doesn't matter what exercise equipment you use because you are simply trying to build a cardiovascular base. It's also doesn't matter how hard the equipment is working – I only care about how hard you are working, which can be determined by your heart rate.

Stage I: This stage is for the beginner who has not been working out. Just like weight training, you have to start by creating a base. In this stage you should start slow and work up to 30-60 minutes in your *zone one*. If you have never worked out before, you might start in zone one for only five minutes at a time. After you can maintain your zone one heart rate for at least 30 minutes for two to three weeks (a beginner might take two to three months), you will then slowly work your way up to stage II. ***The speed may change for each session because you want to be in zone one, and you should, do whatever it takes to stay at that heart rate.***

Stage II: At this stage you should have a good base, but you have not pushed yourself too hard. Stage II is the introduction to intervals, so start by warming up in zone one for 10 minutes, then do a one-minute interval in zone two. You will slowly go up to the second zone within that minute, and once your heart rate hits the top of that zone (153bpm), you will maintain it for the rest of that minute. It might take 45 seconds to reach that heart rate, which means you'll only be at the top end for 15 seconds before reducing the workload (speed, incline, or level), and returning to zone 1. It doesn't matter what type of cardiovascular exercise you are doing, just be sure to increase the workload to get your heart rate up to the top of zone two. After you finish the one-minute interval you will return to zone one prior to repeating the sprint. The most important part of the interval is to recover back to zone one in-between the intervals.

Even though you are in Stage II you still want to alternate with Stage I – which means staggering your sessions into a low intensity day and a high intensity day. For example, if you work out three days a week, then start with stage I on Monday then stage II on Wednesday and back to stage I one Friday. The next week you will start with Stage II. Just keep them in rotation so your workouts will stay balanced. This will become very important as we go into stage III and IV.

Stage III: Now you are ready for the fun workouts. These are for the person who has worked their way up through the stages and needs more work in their *anaerobic threshold- zone two*, or for the person who has hit a plateau after doing aerobic classes for over three months. The goal is to start in zone one, then slowly increase to your *PEAK- zone 3*.

After five minutes in zone one, increase the workload every 30 seconds until you hit zone three. This means you will be slowly climbing through zone two for at least two minutes. After you push for another minute in zone three, decrease your workload. This one-minute break is an important minute to help you gauge your improvement. Drop your workload down to the level you were at when you started the interval. As you improve over weeks of training, this heart rate will drop quicker. The quicker your heart rate drops, the stronger your heart is getting. After a few months of your heart rate consistently dropping to the same number you have a good gauge to use in preventing over-training.

In our example, the 40-year-old client is going up to 162-bpm heart rate in zone three. During this one-minute of recovery they drop to 140 bpm on a normal day. If they come in one day to workout and only drop to 150 bpm during that one-minute break, then they are tired and about to over-train. The solution is to stay in zone one or two for the rest of the workout. The bottom line is this: **they are not rested enough to do this type of exercise today.** It could be because of a hard workout the day before, not enough sleep or even just poor nutrition over the past few days.

If the client's heart rate does drop to the normal rate (140bpm), then overload the body again and go to zone three for a minute. After this minute, go back to zone one for 10 minutes before starting over. If you truly did this interval at your *PEAK- zone 3*, then take a 10-minute break before starting the next interval. At this point, zone one becomes important for recovery, not for fat burning. Remember that you are trying to complete the workout by going to the peaks three to four times. By doing so, the peaks will raise your metabolism to burn fat during the rest of the day, but you will need to recover to truly get to your peak each time. This program is good for muscle toning and calorie burning because of the extended time you spend in zones two and three.

As with stages I and II, it's now time to rotate all three stages. You'll have a low, medium and high intensity day to ensure that you won't over-train. You'll use a "three-intensities" design from this point on. In stage IV the programs will be more individualized and discussed in a future article.

Over-Training

Burning out or over-training can be measured by your heart rate and by how you feel during your next workout. If you are doing an interval to your peak and your heart rate is not dropping (to recovery heart rate) as fast as it normally does, then you've done enough intervals for that day. An example of this would be if your peak heart rate is 160 beats per minute and after a true interval you normally drop to 140 bpm in one minute. If you are over-training, your recovery rate will only drop to around 150 bpm. Or, if you normally do a workout with a speed of 6.0 mph and your peak heart rate is 160, but because of over-training you hit your peak heart rate at 5.0 mph. This is your body is telling you to take the day off or do an easier program. Other signs that you have over-trained are inability to sleep at night and/or overall body fatigue the day after working out. The best way to reverse the over-training is to REST, but you can prevent over-training by understanding your heart rates and through proper nutrition.

Zone 1:		Heart Rate 117
Zone 2:		Heart Rate 153
Zone 3:		Heart Rate 162

Low Intensity Day

30-60 minute workout

5 min. warm-up

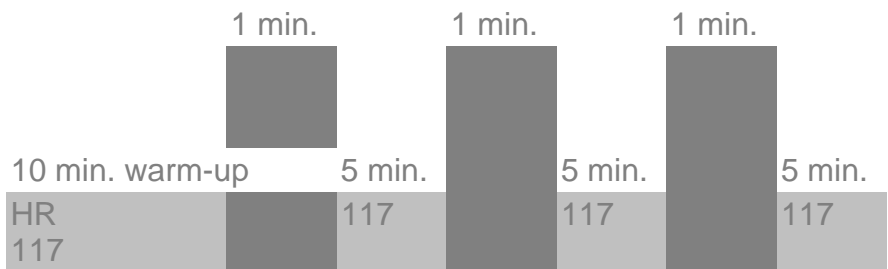


Recovery/Fat Burning day

WORKLOAD

Medium Intensity

28 minute workout

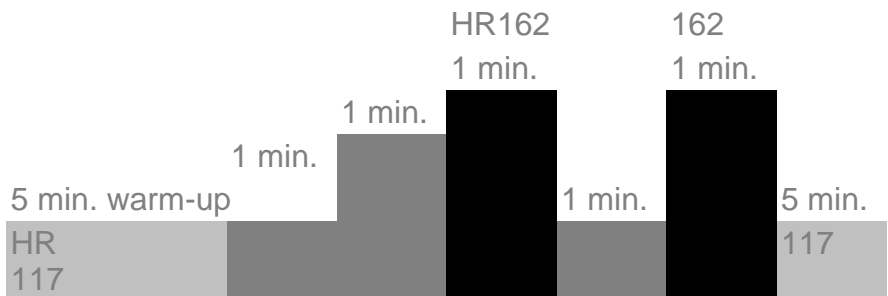


warm-up AT REC AT REC AT cool down

WORKLOAD

High Intensity

15 minute workout, repeat 2-4x



warm-up AT AT PEAK REC PEAK cool down
WORKLOAD

References

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