

Anaerobic Training

Road cyclists or mountain bikers rarely do very strenuous anaerobic endurance training. For beginners such training is even more rare. But for top athletes looking to maximize performance, this type of training helps develop the very skills needed for winning races.

Anaerobic training maximizes cardiovascular capacity and oxygen uptake. The body is trained to perform in high intensity at maximum output. Training occurs over the anaerobic threshold, or at 90-100% of maximal heart rate, and in intervals.

An interval lasts typically between 30 seconds and 5 minutes, with recovery lasting at least as long as the interval. In fact, recovery should last longer, especially when the interval is of longer duration, and the activity is at maximum intensity. Most cyclists bike uphill to reach maximum effect (especially for intervals lasting more than 2 minutes). This way the workload is easily controlled, and the desired intensity zone is reached very quickly.

On even terrain, intervals are usually shorter sprints of, for example, 30 seconds at maximal output, followed by a 30 second recovery before another 30 second maximal sprint. Heart rate usually increases at the end of bouts, and the use of a heart rate monitor is, therefore, highly recommended. Monitoring the workload your body is subjected to without an instrument is difficult.

While doing intervals, keep in mind that an athlete's heart rate reacts with a 30 second delay during maximal exertion. Heart rate corresponding to the workload will only be visible after a while. Using the Polar Power Output Sensor, you can avoid the complications resulting from such a delay, because the Power Sensor registers pedalling efficiency during training.

Allowing time for proper recovery is of great importance when doing anaerobic endurance training. This type of high-intensity training places a large amount of stress on the body, and several days is required for full recovery to occur.

Basic Endurance Training

Having good, basic endurance is a requirement for all cyclists.

If your basic condition is not on a satisfactory level, higher-intensity training will have little or no effect. Your body will simply not be able to recover if you are not in solid shape first. The importance of endurance is heightened during long races. Races lasting several weeks and consisting of several legs require good endurance for every leg. This will also reflect on how quickly you recover during legs.

Training to increase basic endurance aims at developing an athlete's aerobic fitness level.

The benefits of increased basic endurance:

- ✘ Long-distance sessions improve a cyclist's psychological tolerance for "pain" during competition. 5-7 hour rides will train an athlete to recognize personal performance limits, as well as determine ways to exceed those limits, or to at least delay fatigue. This is very often the very skill that wins races.

Endurance training gives results if heart rate levels remain optimal. However, the session will not be spoiled if heart rate levels increase momentarily due to uneven terrain, for example, as long as the more intensive phases do not last too long nor force heart rate above your aerobic threshold.

Long biking sessions in large crowds, on the other hand, may actually result in low-intensity training, especially for a good cyclist. Monitoring heart rate is, therefore, especially important when riding in slipstream to make sure intensity doesn't slide too low. A good cyclist can easily cycle very long distances, but endurance will only improve when heart rate is at least 65% of maximal heart rate.

During long sessions, you should pay extra attention to your pedalling technique to make sure your muscles and nervous system are primed to work continuously in good form. Also, remember that ingesting fluids and solids is imperative during long sessions for maximum results. Consuming carbohydrates during training will speed up the use of body fat reserves.

Fluid Balance

Whether you're training in hot or cold weather, you need to drink frequently.

Over long-term activity, your exercise tolerance decreases because of the water your body loses through sweating - unless you adequately replace the lost fluids. For marathon runners, fluid losses can be as high as 5.4 liters (1.5 gallons) per hour.

If you don't drink enough, you become dehydrated and your body's total blood volume drops. Because the heart has access to less blood, it has to pump faster to circulate the same amount of blood - and your heart rate rises. If you don't replace the lost fluids by drinking, your heart rate will increase, and your ability to perform will decrease rapidly.

So drinking fluids during exercise has several benefits:

- * Fights dehydration
- * Offsets body temperature increase
- * Minimizes cardiovascular stress

Introducing Training Changes

Our bodies take time to adapt. Give yours the opportunity adjust slowly to any changes you make in your training routine. The following guidelines explain how.

Training Volume

The "10% rule" is a useful guideline. Don't increase the volume of your workouts (how much you exercise and for how long) by more than 10% per week. More experienced athletes can probably get away with increasing their volume by 15 or 20% during periods of lesser volume.

Training Intensity

Suddenly starting to do hard, 90% effort intervals is just asking for injury or overtraining stress. Instead, introduce harder training into your routine slowly and gradually. Start with just a few 80% effort repeats, and then build slowly to doing a full set of 85-90% intervals.

Equipment

Even a small change in your equipment or environment - your brand of running shoe, the type of surfaces or terrain you run on, the seat height or seat position of your bike or even the type of pedals you use - can stress your body and cause an injury. Introduce these kinds of changes with care, staying aware of what feels different.

Overtraining

Our bodies are superbly designed for motion and physical activity and are able to withstand quite a bit of accumulated stress.

Still, if intense training is combined with a stressful job or lifestyle or insufficient sleep, or if you're simply exercising too much too soon, your body may be unable to adapt, and overtraining may be the result. Overtraining is most commonly a concern for athletes and others who train for high performance.

Heart rate may be one of the best indicators of overtraining. For many athletes, heart rate monitors can be used as an alarm that alerts them if they're training too hard, beyond levels that improve performance. Overtraining is a common mistake, especially among athletes who believe that more is better and don't take a systematic approach to training.

Your morning resting heart rate is one of the indicators of overtraining. If this before-you-get-out-of-bed heart rate is five or more beats per minute higher than usual, you need to be concerned. An accelerated resting heart rate could indicate that you're overtraining, suffering from fatigue, slightly injured, or even fighting off a fever or a stress-related problem.

Rest is one of the best medicines an athlete can use. Elevated morning heart rates and decreased exercise heart rates for a standard workout are signs that your body is not fully rested and something is amiss-so this isn't the time to take on any hard training.

Some early warning signs of overtraining are:

- * Slower recovery in your heart rate after exercise

General signs of overtraining in competitive athletes:

- * Persistent colds, flu, or respiratory infections
- * The Polar OwnOptimizer recovery test is an easy and reliable way to determine whether your training program is optimally developing your performance.

Recovery

If you train very intensively, you need adequate recovery between training sessions.

Exercise puts positive stress on the body by forcing it to function outside its comfort zone. During rest, the body will make adjustments to better face the challenge next time you exercise. These adjustments are what will make your body stronger. In other words, fitness improves not during exercise but during rest. Giving your body ample time to recover from exercise is therefore crucial to getting fit.

Disregarding the need to rest and recover is quite common practice and may lead to injury, overtraining or fatigue. Resting properly isn't the same as skipping workouts or being lazy. Resting is about giving your body the time it needs to get stronger and fitter.

Suggestions for recovery:

1. Take one or two days off per week from exercising
2. Follow a hard workout day with an easy day
3. Don't be afraid to take a day off or reduce training if you're tired

Speed Training

In cycle racing, as in many other endurance sports, speed is all-important. An efficient speed training zone lies between the aerobic and anaerobic threshold, or around 80-90% maximal heart rate.

The aim of speed training should be to push the athlete's anaerobic threshold upwards (the level at which the body produces more lactic acid than it can eliminate) as much as possible. For most athletes, the anaerobic threshold is 20 bpm below maximal heart rate. In other words, a cyclist with high aerobic threshold will rarely need to exceed it during races.

Another important goal when training for speed is to maximize the duration that the athlete is able to remain inside the speed training zone. This ability to work long periods close to the aerobic threshold is often crucial for winning races.

Speed training usually takes the form of interval training. Individual laps range between 10-30 minutes, and the entire session usually lasts no longer than 50-80 minutes. The number and duration of intervals can vary greatly depending on fitness level. Recovery lasts 5-20 minutes depending on interval duration and fitness level. Most importantly, heart rate should never exceed the anaerobic threshold during intervals. Otherwise, training becomes too heavy and exhausting and will not improve speed.

Speed training can be performed on different types of terrain. Cycling fast on even terrain will work the muscles, while also developing the nervous system necessary for speed cycling. Speed training in the mountains will put strain on the heart and other cardiovascular system, while musclework is slightly lighter in high altitudes. This, in turn, will enable also a less-fit athlete to train for longer periods of time.

Strength Training

Most top cyclists use the bike for their strength training. Typically, they cycle uphill sitting down on the saddle and using a higher gear than normal. Cadence is at a much lower level than normal, approx. 60 rpm instead of 90-100 rpm.

A larger drain is placed on energy reserves than during regular cycling. Monitoring your pedalling rhythm during training is easy with the Polar Cadence Sensor.

Performance intensity is not a high priority since developing muscle strength is the aim of such training. Heart rate is at about the same level or slightly lower than when training for speed (approx. 80-90% maximum heart rate). An individual interval lasts between 1 and up to 10-15 minutes, with a varying amount of repetitions depending on fitness level.

Recovery should last at least as long as the interval, but cadence should remain high to improve the nervous system as well as muscles. Efficient strength sessions usually last 30 minutes. For optimal results, strength training occurs during intensive periods.

Stretching

Whenever you exercise, be sure to stretch.

Stretch first after your warm-up, when your muscles aren't so tight, and again after the cool-down period. Stretching for five minutes after you warm up will improve your workout and help prevent injuries.

Why? Because repetitive exercise tends to reduce muscle flexibility. Also, tissues like muscle and skin lose elasticity with age. So if you increase the intensity or duration of your workouts, maintaining muscular flexibility in your lower legs, thighs, gluteals and back will become even more important.

There are stretching techniques for almost every major muscle group. If you aren't familiar with different techniques, consult any sports physiologist or coach for advice. Below are some tips to help you stretch properly no matter what technique you use.

Stretching Tips

1. Never stretch cold muscles. Be sure to warm them up before stretching.
 2. Hold each stretch for 30-60 seconds to give your muscle time to adapt to the stretch.
 3. Never bounce in a stretching pose or force a muscle into a position that causes pain.
 4. Relax and breathe deeply and slowly while holding each stretch position.
 5. If you are stretching your arms, legs or sides, remember to stretch both sides.
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Tapering

Tapering refers to a period of easy training immediately before a competition.

Before an important race, you might take an entire week of easy, low-volume training (25% of your high-volume week with one or two short, sharp, faster sessions early in the week).

Before a regular weekend race, you might take two to four days easy.

Rest to be at your best!

Warming up and Cooling Down

Much like a high-performance car on a cold winter morning, our bodies need to start with a slow "warm-up" period before we can increase the pace into a full workout.

This crucial period allows blood to be directed from the abdominal organs and towards the exercising muscle so that it can get the oxygen and energy it needs. Blood also moves toward the skin to allow the extra heat created to escape, causing the body to sweat.

At the end of a workout, the cool-down period allows the body to flush out metabolic waste from exercise, such as lactic acid. It also ensures that the heart rate and distribution of blood flow returns to normal gently.

Warm-Up Examples

For Beginners:

Run - 10 minutes starting at a fast walk, easing into a slow, comfortable jog

Cycle - 10 minutes spinning (pedaling with a high cadence of 90-100 revs per minute) easily in a low gear

Swim - 10 minutes easy swimming in varied strokes, also taking the time to practice stroke drills and technique

For Competitive Athletes:

Run - 5-10 minutes warm-up for runs up to 80% HR_{max} . 15-20 minutes for hard intervals or time trials, finishing the warm-up with a thorough stretching session.

Cycle - 10-15 minutes warm-up for any ride up to 80% HR_{max} . 30 minutes warm-up for hard intervals or time trials, finishing the warm-up with a thorough stretching session.

Swim - 800m using different strokes, stroke drills.

Polar sport zones

Polar sport zones spell a new level of effectiveness in heart rate-based training. Training is divided into five sport zones based on percentages of your maximum heart rate. With sport zones, you can easily select and monitor training intensities and follow Polar's sport zones-based training

programs.

TARGET ZONE	INTENSITY % OF HR _{max}	EXAMPLE DURATIONS	PHYSIOLOGICAL BENEFIT / TRAINING EFFECT
5 MAXIMUM	90 - 100%	intervals 8 sec - 3 min	> Tones the neuromuscular system > Increases maximum sprint race speed
4 HARD	80 - 90%	intervals 2 - 12 min	> Increases anaerobic tolerance > Improves high speed endurance
3 MODERATE	70 - 80%	intervals 8-45 min	> Enhances aerobic power > Improves blood circulation
2 LIGHT	60 - 70%	60 - 300 minutes	> Increases aerobic endurance > Strengthens body so that it tolerates higher intensity training > Increases fat metabolism
1 VERY LIGHT	50 - 60%	20 - 60 minutes	> Helps and speeds up recovery after heavier exercises

Cycling in **sport zone 1** is very low-intensity. Instead of resting during recovery, speed the process up by training in this zone.

Endurance training at an easy pace in **sport zone 2** is an essential part of every cyclist's training program. Cycling long distances in sport zone 2 increases metabolic economy. It helps save glycogen for higher intensities and uses fat as the main energy source.

Aerobic power is enhanced in **sport zone 3** with mainly aerobic cycling. Training can consist of long intervals, for example uphill intervals or high-cadence intervals.

Cycling in **sport zones 4 and 5** means cycling anaerobically in intervals of up to 12 minutes. The shorter the interval, the higher the intensity. Sufficient recovery between intervals is very important. Polar sport zones makes training easier (planning, controlling and documenting), especially for beginners and intermediate cyclists. Polar sport zones can be personalized by using a measured maximum heart rate.

When cycling in a certain sport zone, the mid-zone is a good target but you don't need to keep your heart rate at that exact point all the time. Training intensity, recovery level, environmental and other such factors will all contribute to heart rate responses. It is, therefore, important to pay attention to subjective feelings of tiredness and to adjust the training program accordingly.

Introduction to the Polar Cycling Training Programs

Polar cycling training programs are designed to help you reach your goals.

For a personalized cycling training program, go to the www.polarpersonaltrainer.com web service. You can choose a training program to improve your fitness level or an event program if you are aiming for a cycling event. There are also specific training camp programs for those interested going on a cycling camp.

The new cycling training programs are developed by elite coach Lothar Heinrich in cooperation with Polar. Dr. Lothar Heinrich, from the department of sports medicine at the University of Freiburg, is specialized in exercise physiology, training and nutrition. Dr. Heinrich is the physician for the T-Mobile

team, and the German men's road cycling team during the Sydney and Athens Olympics as well as the World Championships since 1997.

The program is based on the Polar sport zones method with all training broken down into five different intensities. This will help you understand what is required in each workout. For more information on Polar sport zones take a look at the article Polar sport zones.

Aiming at an event?

To prepare for a cycling event, choose between a program that prepares you for a one-day event and a program that prepares you for a stage event. Your fitness level will determine the program level most suitable for you. These programs are six weeks long, during which fitness level will increase and event performance is maximized.

Prefer a training camp?

Combine cycling and leisure by selecting a training camp program. These programs give you training instructions for one or two weeks, while still giving you the opportunity to enjoy your surroundings while you cycle. This program is also perfect to get you in shape for the cycling season.

Cycling to improve fitness?

If you want to get fit by cycling but are not preparing for a specific event, choose a program that improves fitness level. These programs last four weeks, after which you can reprofile yourself for a slightly heavier program.

A Training Plan that Motivates

We all have our own reasons to take up cycling. Some of us cycle to improve fitness or health, others enjoy the social aspect of the sport, while others cycle to manage weight. Whatever the reason, making exercise as enjoyable and interesting as possible is always a good idea, to make sure you stay enthusiastic about your new hobby for a long time.

Goal-oriented planning is a well-established trend in the business world, and the same principles can be successfully applied to fitness.

Monitoring heart rate parameters is an easy way to observe the way your fitness improves. Rather interestingly, exercising really does lead to better results. All you need to do is to determine your personal goals and to reach for them through regular exercise. A well-defined goal is sport-specific and challenging, yet within reach (e.g. joining a cycling event).

Making a training plan is wise, mainly for good time management. With a clear schedule, you know how much time is needed for training, and can schedule remaining time accordingly. Schedule per week, month or period, but allow for periodical goal adjustments to keep you interested in the way your fitness is improving. You would also be wise to set up short-term goals, to make sure you're on track and allow for corrections.

When you plan per week, remember to alternate heavier days with lighter ones, and not to schedule all your sessions for the weekend. Spread them out evenly throughout the week for better results.