

Lactate threshold (LT) training

Lactate threshold (LT) training is a popular method of improving high intensity endurance performance. While [VO2 Max](#) may indicate an athlete's genetic potential and natural ability, their lactate threshold can be increased substantially with the right training program. Athletes often use their lactate threshold to determine how to train and what sort of a pace they can maintain during endurance sports. Because the lactate threshold can be increased greatly with training, many athletes and coaches have devised complicated training plans to increase this value.

What is the Lactate Threshold?

The lactate threshold is a point during exhaustive, all-out exercise at which lactate builds up in the blood stream faster than the body can remove it. Anaerobic metabolism produces energy for short, high-intensity bursts of activity (lasting no more than a few minutes) before the lactate build-up reaches a threshold where it can no longer be absorbed and, therefore, accumulates. This point is known as the lactate threshold and is usually reached between 50 to 80% of an athlete's VO2 max.

During moderate exercise the lactate can be absorbed quickly, but with high-intensity exercise it is produced faster than the body can absorb it. This lactate threshold is marked by a slight drop in pH (from 7.4 to about 7.2) that is thought to and cause fatigue and reduce the power of muscle contractions. At this point the athlete is forced to back off or slow down. Presumably, having a higher lactate threshold means an athlete can continue at a high-intensity effort with a longer time to exhaustion. Because of this, many consider LT a great way to predict athletic performance in high-intensity endurance sports. LT is also used by many athletes to determine training plans.

Measuring Lactate Threshold

In the lab, lactate threshold tests are performed in a similar manner to VO2 Max testing and use either a treadmill or stationary bike. The exercise intensity is increased in periods of about 4-5 minutes and blood samples are taken with a finger stick at the end of each period. Along with blood lactate concentration, heart rate, power output and VO2 are often measured. This process continues until the blood lactate concentration increases significantly. This tends to be a fairly obvious spike in the data. Because lactate threshold occurs sooner than VO2 max is reached, it is often measured as a percentage of VO2 max. Athletes and coaches measure the power output (usually in watts/kg) at their lactate threshold in order to design training programs.

Estimating Lactate Threshold

While not many people have the ability to measure their actual lactate threshold, there are tests that provide estimates. One simple way to estimate your lactate threshold is to perform a 30-minute time trial at a high, sustained pace. This test is suited to experienced athletes and should not be attempted by anyone who is not in top shape. The goal of this test is to exercise for 30 minutes at the highest effort that can be sustained and monitor your heart rate throughout the test. Your average heart rate during the final 20 minutes should correspond to your LT.

30-Minute Time Trial for Estimating LT

- You can perform this test by running, cycling, swimming or doing another endurance sport that can be sustained for 30 minutes
- You will need a heart rate monitor and a way to capture splits
- Warm up for 15 minutes
- Begin exercise and work up to your peak, sustained intensity within the first 10 minutes
- Record your heart rate each minute for the last 20 minutes
- Calculate your average heart rate over the last 20 minutes
- This figure is your estimated heart rate at your lactate threshold

Lactate Threshold Values

- The average person reaches their LT at 60 percent of their VO₂ max
- Recreational athletes reach their LT at 65-80 percent their VO₂ max
- Elite endurance athletes reach their LT at 85-95 percent their VO₂ max

Increasing Lactate Threshold

Debate continues regarding the science of the lactate threshold, whether there is such a point, and the value of trying to measure it at all. The good news for athletes is that although these numbers may or may not be proven, it has been shown that with training athletes are able to tolerate higher intensity exercise for longer periods of time.

Two simple ways to help increase your LT include:

- **Proper Training**
LT training means increasing your exercise intensity so you train at or just above your LT heart rate. This training can be interval training or steady training.
- **Interval LT Training**
Sample Plan: Twice a week perform three to five 10 minute high effort intervals at 95-105 percent of your LT heart rate with three minutes of rest between intervals.
- **Continuous LT Training**
Sample Plan: Twice a week perform one 20-30 minute high intensity effort at 95-105 percent of your LT heart rate.

Proper Nutrition

To boost your LT during training and racing, you need to make sure you can exercise at a high intensity without running out of glycogen stores. This requires careful nutritional meal planning both in the [pre-exercise meal](#) and [post-exercise meal](#)