



Training Tip

Resource Library

November, 1998 Improving Your Lactic Acid Threshold

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Introduction

The expression lactic acid, or lactate, is used most commonly to describe the intense pain felt during exhaustive exercise, especially short events like the 400 meters and 800 meters. To explain what it is we first have to look briefly into how the working muscles use energy (ATP). Actively contracting muscles obtain Adenosine Triphosphate (ATP) from glucose stored in the blood stream and the breakdown of glycogen stored in the muscles. Initially pyruvic acid and small amounts of ATP are generated from the breakdown of glucose. The pyruvic acid mixed with oxygen is converted to carbon dioxide, water and ATP. When muscles contract vigorously for long periods the circulatory system begins to lose ground in delivery of oxygen. In these conditions most of the pyruvic acid produced in the breakdown of glucose is converted to lactic acid (LA). As the lactate is produced in the muscles it leaks out into the blood and is carried around the body. If this condition continues the functioning of the body will become impaired and the muscles will fatigue very quickly. When oxygen becomes available the lactic acid is converted to pyruvic acid and then into carbon dioxide, water and ATP.

Given that high levels of lactate will be detrimental to performance, one of the key reasons for endurance training is to enable the body to perform at a greater pace with a minimal amount of lactate. This can be done by long steady runs, which will develop the aerobic capacity by means of capillarisation (formation of more small blood vessels, thus enhancing oxygen transport to the muscles) and by creating greater efficiency in the heart and lungs. If the aerobic capacity is greater, it means there will be more oxygen available to the working muscles and this should delay the onset of lactic acid at a given work intensity.

Anaerobic Threshold

Lactic acid starts to accumulate in the muscles once you start operating above your anaerobic threshold. This is normally somewhere between 85% and 90% of your maximum heart rate (MHR).

What a low Lactate Threshold means

If your lactate threshold (LT) is reached at a low exercise intensity, it often means that the "oxidative energy systems" in your muscles are not working very well. If they were performing at a high level

they would use oxygen to break lactate down to carbon dioxide and water, preventing lactate from pouring into the blood.

If your LT is low it may mean that:

- you are not getting enough oxygen inside your muscle cells
- you do not have adequate concentrations of the enzymes necessary to oxidize pyruvate at high rates
- you do not have enough mitochondria in your muscle cells
- your muscles, heart, and other tissues are not very good at extracting lactate from the blood

Improving your Lactic Threshold

The aim is to saturate the muscles in lactic acid which will educate the body's buffering mechanism (alkaline) to deal with it more effectively. The following are example sessions (running) to help improve your LT.

- 8 * 200 meters at 100% effort - recovery 4 minutes
- 4 * 75 seconds at 100% effort - recovery 5 minutes
- 5 * 60 seconds at 100% effort - recovery 2½ minutes
- 3 * 90 seconds at 800 meter pace - recovery 4 minutes
- 3 * 120 seconds at faster than 1500 meter pace - recovery 5 minutes

A session should be conducted once a week and commence eight weeks before a major competition. This will help the muscle cells retain their alkaline buffering ability.