

During my time in Philadelphia, I joined the **Cadence** Fall Training camp, this is a 12 week intensive in-door training camp held twice weekly. At Cadence, full-suite physiological testing services like blood lactate testing and Max VO₂ testing are provided in-house by their world-class cycling and multisport coaches. These services are identical to those provided at Olympic training centers and enable Cadence coaches to provide athletes with precise power and heart-rate zones for optimized training and results.

Blood Lactate Threshold Testing

Blood lactate is the by-product of anaerobic energy production in the muscle cells. Your lactate threshold is the point at which lactate starts to accumulate in the blood faster than it can be metabolized by your body. During exercise, an athlete can perform up to a certain intensity without accumulating lactate in the blood. Once this intensity is exceeded, lactate levels in the muscles rise, and the muscles fatigue rapidly. The critical exercise intensity at which this occurs is referred to as your lactate threshold. The lactate threshold (or, LT) is a critical determinant of performance in endurance sports and, unlike your VO₂ max, your LT can change significantly over the course of a season. In fact, one of the very reasons for training is to increase your LT power (Watts).

At Cadence the coaches used the Onset of Blood Lactate Accumulation (or, OBLA) protocol to determine an individual's own LT. Using this protocol, tiny blood samples from my fingertips were sampled periodically as I cycled on the Velotron ergometer. Once I reached a workload intensity, which is measured in wattage that produces a blood lactate of 4.0 mmol/L your individual LT can be identified. Having this information is crucial for you and the coach to build an optimized training plan.

Individual Train Plan

After the results of the LT test are determined, a set of 'Training Zones are established based up on LT, Heart Rate and Perceived exertion. The zones are set up as follows for each individual athlete based on their own performance. A copy of my initial results are shown below:-

NAME:
Weight:
Height:

Matt Rogers
195
71

Session Date 29/10/2007



TRAINING ZONES - CYCLING

Training Zone	HR		Power		PE (0-10)	Zone Description
	Min	Max	Min	Max		
Recovery Zone 1	Rest to 0	0	0	to 137	<3	<p>Active Recovery</p> <p>Very low level exercise. Easy spinning on the bike with very light pedal pressure, possibly only with the weight of the legs. Recovery rides are done to accelerate the Recovery process by flushing lactate from the muscles and stimulating blood flow without causing any muscle damage. Heart rate is below 68% of LT HR and power is below 55% of LT Power. Perceived Exertion (PE) is less than 3 out of 10.</p>
Endurance Zone 2	0 to 0	0	140	to 207	4-5	<p>Endurance</p> <p>The HR Zone that a rider will be in for base mileage. Training at this level should increase aerobic Endurance. Sensation of leg effort and fatigue is generally low, though it may occasionally rise to higher levels. Heart rate is 69-92% of LT HR and power is 56-82% of LT Power. PE = 4-5 out of 10 ***Some training areas are very hilly and the athlete must go outside their personal Endurance HR Zone for a short period of time to get over a hill and into an area that they can sustain their Endurance Zone HR.</p>
Sub-LT Zone 3	0 to 0	0	210	to 237	6	<p>Sub Lactate Threshold</p> <p>The HR Zone below Lactate Threshold, but above average Endurance pace. Represents the typical intensity of a "spirited" (steady paced) group ride or a briskly moving paceline. Heart rate is 83-95% of LT HR and power is 84-95% of LT Power. PE = 6 out of 10</p>
LT Zone 4a	0 to 0	0	240	to 250	7	<p>Lactate Threshold</p> <p>Just below Lactate Threshold, training in this Zone should increase power output at LT. Heart rate is 96-99% of LT HR and power is 96-99% of LT Power. PE = 7-7.5 out of 10. Lactic acid produced at this level but usually is not sufficient enough to impair performance. Training in this zone increases your tolerance and ability to metabolize lactic acid.</p>
Super - LT Zone 4b	0 to 0	0	252	to 262	8	<p>Super Lactate Threshold</p> <p>Just above your LT, this is the HR Zone in which most climbs and time trials should be done in, though intervals will be shorter than in the LT Zone. Heart rate and power are 100-105% of LT. PE = 8 out of 10. Training in this zone increases your tolerance and ability to metabolize lactic acid. Conversation difficult at best, due to depth/frequency of breathing. These efforts are typically performed in training as multiple repeats of 10-30 min duration.</p>
VO2 Max Zone 5	0 to N/A	0	265	to 300	9	<p>VO2 Max</p> <p>This zone is designed to increase power output at VO2max. Typical intervals are (3-8 min) intervals intended and there is strong to severe sensations of leg effort/fatigue, such that completion of more than 30-40 min total training time is difficult at best. Heart rate is above 106% of LT and power is 106-120% of LT Power. PE = 9 out of 10. Conversation not possible due to often 'ragged' breathing. Should generally be attempted only when adequately recovered from prior training - consecutive days of level 5 work not necessarily desirable even if possible.</p>
Sub-Maximal Zone 6	N/A to N/A	N/A	302	to N/A	9.5	<p>Sub-Maximal</p> <p>Short (30 s to 3 min), high intensity intervals designed to increase anaerobic capacity. Heart rate generally not useful as guide to intensity due to non-steady-state nature of effort. Severe sensation of leg effort/fatigue, and conversation impossible. Consecutive days of extended level 6 training usually not attempted. Power should be over 121% of LT Power. PE = 9.5 out of 10.</p>
Maximal Zone 7	N/A to N/A	N/A	N/A	to N/A	10	<p>Maximal</p> <p>Extremely short (less than 25 second) efforts at Maximal intensity. Heart rate is not a useful guide because of the short length of the intervals and power is useful only as a reference point to prior similar efforts. PE = 10 out of 10.</p>

During each hour long session we are asked to work in a zone for a set period of time, usually 2-3 minutes before we go up to the next zone etc. etc.

The training sessions are designed to increase your LT threshold by training your body to go beyond its normal range, recover and then again go above and beyond what you would normally be capable of. By continually pushing the barriers, then resting and going again the body is able to achieve higher power without going into the LT zone.

During my initial 20 minute time trial my average watts produced was 240, after 7 weeks of training a second 20 minute time trial was carried out, this time my average power had gone up to 263 watts, this represented an increase in average power of almost 8%. Typically the coaches expect to see on average a 12% increase over the full 12 week training program, however due to my return to the UK I was unable to complete the full 12 week program and so do not have a final result.

Attached is a photograph of the training center. Individuals bring their own bikes and connect them to a turbo trainer linked to a 'Compu-trainer' power meter. Results of each session are downloaded automatically to a computer so that the coaches can review each session.

During the 20 minute time trials, all the competitors, wattage, speed, distance and cadence are displayed on one of the wall mounted screens along with a graphical representation of each rider so you can compare yourself to other athletes.

For more information about Cadence visit www.cadencecycling.com

