A GUIDE TO ANAEROBIC TRAINING
‘SECONDARY REMOVAL SETS’

OVERVIEW

High lactate concentrations can be achieved through *lactate production sets*, *lactate tolerance sets*, or *racing*. It is very important that whenever a high lactate concentration is achieved, adequate swim down is provided to return the body to a normal resting state, or *homeostasis.* This will ensure more rapid recovery from the session. Practical experience has demonstrated that the more anaerobic an athlete is, and the more often the athlete achieves high lactates in training or racing, the more careful one must be to ensure adequate swim-down and recovery is provided.

Swimming down can be performed a number of ways. However whenever a high lactate concentration is achieved, there is an opportunity to do more than just swim down, but to actively train the lactate removal ability. This can be achieved with the use of a **secondary removal set.**

A secondary removal set is performed after the completion of a main set which results in a high blood lactate concentration. The ‘quota’ of race specific work would usually be used up in the main set, so secondary removal sets are not race-speed-specific, and therefore not as demanding on substrate utilisation (glycogen) as a speed- specific removal set. These sets train the general removal capabilities by providing a sustained challenge to the removal and buffering processes.

Secondary removal sets can be done as *swim* or *kick*. As the kick muscles are the biggest muscle groups in the body, and therefore probably play a large role in the metabolism of lactate, **kick removal sets** seem to be particularly effective.

GUIDELINES

Secondary Removal Sets should adhere to the following guidelines:

- **Follow High Lactate Sessions**
  These sets should immediately follow high-lactate sessions. They should be started while lactate still high but with enough recovery provided for the swimmers prepare to swim fast enough at the beginning of the set – perhaps 100 easy.

- **Decreasing Intensity (Effort)**
  The intensity of these sessions generally decreases as the sets progress. Therefore the set gets easier as it progresses.

- **Kick is Particularly Effective**
  Kick seems to be a particularly effective way of doing these sets, as the muscles used in kick are amongst the biggest muscles in the body. A mixture of kick and swim is also a good idea as this keeps blood flowing to all muscles used in the main set.

- **Intermittent Spikes**
  Intermittent spikes can be used to push the lactate back up, therefore requiring longer to remove the lactate and prolonging the duration of the set.

- **Monitor Lactate Where Possible**
  Aim to slowly reduce lactate over the set (e.g. may reduce from 14mM to 7mM) – more swim down will usually be required following the set. If possible it can be useful to measure lactate concentrations through this set to ensure that the intensities and cycles are appropriate and that lactate is being removed, although not too quickly.

- **Volume**
  The volume of these sets is usually in the range of 900m-2000m.

SAMPLE SETS

4 x 3 x 100m kick on 2'00
100m swim on 2'30
(1st set max. Decrease 'effort' from set 1-4)

This is a simple but effective kick removal set. It is important that the first three efforts are max, even though the swimmer will be fatigued from the previous main set. The effort then decreases each set. You could say each set has to be 3s slower, but quite often the times won't get much slower. As the sets progress, swimmers tend to find that they can hold the same times with much less effort. The 100m swim in each block ensures blood flow is maintained to the upper-body to clear lactate from these muscles.

4 x 50 kick max on 60"
150 kick on 2'45
2 x 100 kick on 1'45
100 swim on 2'30

This set uses a 50 max kick to spike the lactate up, followed by the 150 and 100, which should be on reasonably challenging cycles. In the first set the swimmers will have to work very hard to make the cycle, but as the sets progress they will find it easier to make the cycle.

2 x 100 swim on 1'30

#1-3 best effort
#4-6 within 3s of 1-3
#7-9 within 6s of 1-3
#10-12 within 9s of 1-3

*This is a secondary **swim** removal set, again with ascending times, such that the set gets easier as it progresses. The 'Best Effort' swims are unlikely to be very fast, as the lactate will be extremely high at this stage.*