

## TRAINING SPECIFICS IN RELATION TO AEROBIC & ANAEROBIC CONDITIONING OF SWIMMERS

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**Training specificity** is a term mentioned often in the literature published on the physiological conditioning of the swimmer. Basically, there are two categories ... **SPECIFIC** and **NON-SPECIFIC**. For the purpose of this discussion these two classifications relate to specific as training at speeds directly relating to the race being trained for and non-specific as all training other than this.

### NON-SPECIFIC

The majority of our training time and volume is composed of non-specific training sets. These sets more commonly involve conditioning in the aerobic range from A1 up to anaerobic threshold. This variation in intensity will produce heart rate ranges of 30-100 beats below maximum. For a person with a maximum heart rate of 200, this equates to 170-100 beats per minute.

It is an established fact that large doses of aerobic training across a broad range of intensities are beneficial in developing the training and performance capabilities of the swimmer. Improvement is gained through the development of...

- Capillarisation
- Increased Stroke Volume
- Increased Blood Volume
- Increased red, blood, cell count
- More efficient gas exchange
- Improved energy delivery by the muscle
- Improved reprocessing of the waste products produced as a result of oxidation

Other benefits of aerobic training are...

- Improvement and consolidation of Stroke Technique
- Strengthening of the muscle and joint structures
- Improvement in connective tissue structure

The overall result is being able to train at high volumes and higher speeds with lower blood lactate levels.

Aerobic training assists in the removal and resynthesising of lactic acid.

### AEROBIC TRAINING ZONES

<b>A1</b>	60bpm and less
<b>A2</b>	60-50bpm
<b>A3</b>	50-30bpm
<b>AT</b>	30-20bpm
<b>VO<sub>2</sub></b>	20-10bpm (incorporates a significant aerobic component)

### WORK TO REST RELATIONSHIPS

As a general rule, the lower the intensity, the shorter the rest period and the longer the repeats. A1 and A2 intensities usually involve continuous swimming or long repeat distances, with the rest after each repeat being quite short regardless of its length. For 50m and 100m repeats – 5 to 10-seconds rest maximum. For 200m to 400m – 15 to 20-seconds rest maximum. For repeats longer than 400m, no more than 30-seconds rest maximum.

A3 intensity again only requires short rest intervals similar to A1 and A2 with the added stress coming from the increase in swimming speed.

**Anaerobic Threshold Training** involves a broader range of rest periods. Shorter rest periods are preferable for the distance type swimmer (particularly females). The objective with this training for

this type of swimmer is to swim at the required intensity with the shortest rest possible while maintaining control. Suggested rest interval ranges are...

50s 5-10 seconds rest  
 100s 5-15 seconds rest  
 200s 10-20 seconds rest

Swimmers with a predilection for the 400m and down events require longer rest at this intensity in order to maintain control. The rest periods more appropriate for these swimmers are...

50s 10 seconds rest  
 100s 15-25 seconds rest  
 200s 20-30 seconds rest

VO<sub>2</sub> or oxygen uptake or heart rate sets ... as they are often referred to ... are very intense aerobic work, coupled with a significant anaerobic component. The rest period in this work is longer than the categories previously described. The lactate clearance mechanisms are placed under significant pressure in these training sets.

The sets in this category, which are performed by distance swimmers, tend to be vastly different to those performed by the sprint type swimmers. At the Age Group level, the differentiation is less obvious.

In this zone, the distance swimmer often swims very close to race speed – usually with some repeats faster than race pace. For a set of 100s, the rest period would be about 40 seconds/100. Female distance swimmers may benefit from shorter rest in this type of set with perhaps 20-30 seconds being more appropriate. A common set performed by male distance swimmers in Australia is 30x100 on 1.40.

The 100/200 swimmer doing this type of work will achieve the required intensity well below race speeds. The set design usually allows for shorter repeats of 50-100m of about 1:1 work rest ratio and often broken up into mini sets ... for example...

3x(2x100 on 2.00, 4x50 on 60, 1x100 recovery on 2.00

This design will allow the swimmers to keep their lactate under control and maintain a consistent intensity throughout the set.

Except for the VO<sub>2</sub> sets and certain AT sets performed by the distance swimmers, which are swum at race speed, the rest of the swimming done in these categories is providing general conditioning or fitness. This type of training is vital as it is absolutely essential in building the fitness foundation to enable the swimmer to take full advantage of the very high intensity race specific work.

**Non-specific Anaerobic Training** is also included in the training routine. This training comes in various forms and is relatively specific to stimulating the anaerobic energy systems but not entirely specific to training for a particular race or event.

Forms of anaerobic training...

High Velocity Overloads or Alactic Sprints	10-25m maximum efforts
Muscular or Speed Endurance	25-75m quality efforts
Lactate Production	50-100m quality efforts
Lactate Tolerance	100-200m quality efforts
MVO <sub>2</sub>	Certain set designs can have a high anaerobic component

## SPECIFIC

The term **SPECIFIC TRAINING** is referring to set designs that are closely related to the event being trained for. The repeats are performed at race speed – according to the desired splits, race stroke rate, stroke count – and with the breathing pattern used in the race.

**Race Specific Training** needs to be done twice per week. It can be presented as sets done entirely at race pace or integrated with other repeats at lower intensities. The introduction of this work is often left too late in the preparation, resulting in incomplete adaptation to this training influence. Swimming at racing speeds can be introduced early into the preparation with the volume being adjusted according to the swimmer's ability to cope.

### **CONSIDERATIONS FOR DESIGNING & PERFORMING SPECIFIC TRAINING SETS**

- It is critical for the swimmer to be able to swim at race speed.
- The rest period must be long enough for speed maintenance but short enough in some sets to create an endurance stress.
- The swimmer must practice swimming at the required speed with the desired stroke rate and stroke count.
- The 100m events require sets designed for the first 50 – as distinct from sets created for the second 50.
- Racing at constant velocity is a common strategy used in the events 200, 400, 800 and 1500.
- Specific sets may need to be developed for the first 50 split of the 200, first 100 of the 400 or first 200 of the 1500.
- Speeds need to be determined from the projected race time and not current PB.
- Individual Medley sets need to be done as broken IM's as well as sets dedicated to each particular stroke.
- Swimmers need to learn what the selected stroke rate and speed feels like – get regular feedback from the swimmer of what they think their stroke rate and time was. By doing this, the swimmer will become more in tune with their body.
- For sets for the first 50 of the 100 ... repeats can vary from 25-40m. The second 50 is best reproduced with 50m repeats. Maximum distance of 400-500m per set.
- Sets for the 200 events are best done as 50s with a maximum distance of the sets achieving up to 800m.
- 50s and 100s are the best repeats for the 400 race pace work. A well-conditioned swimmer can expect to swim about 1200m in one of these sets.
- Race speeds for the distance swimmer are regularly achieved in their VO<sub>2</sub> or heart rate sets. Up to 3000m are swum in these sets.

**Race Specific Training** is an essential part of all preparations and must be included in the training cycles from the early stages of the preparation to achieve a complete adaptive response.

### **SPECIFIC TRAINING FOR 100M EVENTS**

The 100m event needs to be broken into two parts ... the first 50 and the second 50 ... and specific training sets need to be created for each component.

#### **Considerations for FIRST 50 Sets**

- The **FIRST** 50 is swum at speeds that are not easily achieved as 50s in day-to-day workouts. Swimmers can reproduce one or two 50s in this time but not enough repeatedly to gain a significant training effect.
- The **FIRST** 50, therefore, needs to be broken down into shorter distances to ensure that speed can be maintained at the required stroke rate. This will allow the swimmer to complete enough repeats to create a significant training effect.
- The preferred repeat distances are longer than 25m. The ideal repeats are 30m, 35m and 40m – although 45s and 50s can be included sparingly.
- Swimming at the speed and target stroke rate are critical factors. The rest periods must be long enough in order to maintain speed.
- The desired race or competition model is essential. We need to know the 25m split, the 50m split, 75m split, the 100m time, the stroke rate and stroke counts.
- From the above, we can determine the 30, 35, 40 and 45m splits. This is worked out by subtracting the **FIRST** 25m split from the **FIRST** 50m split. From this, the split for each additional 5m beyond the 25 can be determined.

### Example:

**FIRST** 50 split 25.00, 25m split 11.00, difference gives time for **SECOND** 25 = 14.00 sec

Divide 14 by 5 to determine the time for each 5m interval = 2.80 sec

$$30\text{m} = 11.00 + 2.8 = 13.8$$

$$35\text{m} = 13.80 + 2.8 = 16.6$$

$$40\text{m} = 16.60 + 2.8 = 19.4$$

$$45\text{m} = 19.40 + 2.8 = 22.2$$

$$50\text{m} = 22.20 + 2.8 = 25.0$$

### CONSTRUCTING THE SETS

With the above information, we can construct any sets the coach might like to create. Depending on the swimmer, and their conditioning, total set distance of 400-800m can be performed at the required velocity. The swimmer must reproduce the required splits at the correct stroke rate with each repeat starting from a dive. Some examples are...

```
(4x30 @ 13.8 sec 70 steady for lactate clearance on 2.15)
4x
  (300 HR 50bbm 6.00)
  (3x30 @ 13.8 sec 70 steady 2.30)
  (2x35 @ 16.6 sec 65 steady 2.30)
2x
  (1x40 @ 19.40 sec 60 steady 2.30)
  (400 recovery on 7.00)
  (1x30 @ 13.8 sec 70 steady)
  (1x35 @ 16.6 sec 65 steady)
4x (1x40 @ 19.4 sec 60 steady)
  (1x45 @ 22.2 sec 55 steady)
  (400 recovery 7.00)
```

- **SECOND** 50 sets are best constructed around 50m repeats as these speeds are more easily achieved throughout the preparation period.
- Total set distances at these speeds may range from 300-500m.
- Straight sets can be done but broken sets usually draw a better performance.

Based on the above example, the **SECOND** 50 split might be 26.50 sec at 52 stroke rate. Some example sets...

```
8x (50 @ 26.5          1x100 recovery on 3.30)
4x (2x50 @ 26.5 on 1.30    1x200 recovery 3.30)
  (3x50 on 2.30 @ 26.5 1x150 recovery 3.00)
  (2x50 on 2.15 @ 26.5 1x100 recovery 3.00)
  (1x50 on 60 @ 26.5    1x50 3.00)
  (2x50 on 2.15 @ 26.5 1x100 recovery 3.00)
  (1x50 on 60 @ 26.5    1x50 recovery)
  (2x200 HR 50bbm 3.00)
  (2x50 @ 26.5 on 2.00)
2x
  (1x200 HR 40bbm 4.00 HR 40bbm (Lactate Clearance))
  (1x50 @ 26.5 on 2.00)
```

It is up to the coach's imagination for the set design but the key points are...

- Perform these sets once a week.
- They only achieve their purpose if they are swum at the correct speed and stroke rate.
- Feedback between swimmer and coach is vital.
- If the swimmer is too fatigued to swim at the required speeds, do the set at another time.

**RACE PACE WORK IS ONLY RACE PACE WORK WHEN IT IS SWUM AT RACE PACE**