BRIEF REPORT

Implementing Ultra-Short Race-Pace Training (Usrpt) In Swimming

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Professor Brent Rushall defined USRPT in 2011 (Rushall, 2011). It involves high intensity swimming in sets that match the best-achieved velocities of individuals' races. When certain criteria are reached in training sets, training velocities are increased. To facilitate the greatest volume of race-pace training, the ultra-short training format is used. That format generally consists of a high number of repetitions over short distances with brief rests (generally no longer than 20 seconds). The aim of the USRPT format is to cover the greatest accumulated distance at race-pace for every event of interest. The system is self-correcting, preventing swimmers from becoming systemically exhausted, USRPT and the science upon which it is based is a completely different format of coaching to traditional coaching. Coaches have to work harder, particularly in providing feedback about aspects of technique; swimmers receive performance feedback every practice item in a training session and are therefore motivated to participate in the sport more willingly, with enthusiasm, and with an expectation of often-daily performance improvements. Those characteristics do not exist in traditional training settings.

USRPT physiological basis

Stored Oxygen

Recent swimming research has indicated that in single races, stored oxygen and the alactacid and aerobic energy systems are dominant while considerable amounts of Type IIa fibers developed through specific training add to the oxidative energy pool for racing. As the activity is initiated, the greater amount of energy comes from stored oxygen and the alactacid system. The major change has been the added recognition of stored oxygen (oxyhemoglobin and oxymyoglobin) as a source of aerobic support at the commencement of ultra-short work intervals When partial intense stored oxygen and alactacid activities occur in a short time (as in swimming racing), it is unlikely that maximum fatigue of this aspect of energy provision will be achieved.

Neuromuscular Patterning

Neuromuscular patterning, the case was made for race-specific techniques and their energizing as being inextricably yoked and represented as discrete brain activation patterns. The result is that the only way to improve swimming velocities for specific races is to practice swimming at those velocities or slightly faster, Neuromuscular patterning, the case was made for race-specific techniques and their energizing as being inextricably yoked and represented as discrete brain activation patterns. The result is that the only way to improve swimming velocities for specific races is to practice swimming at those velocities or slightly faster.

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With the specific parameters of each training set (swimming velocity, duration of rest, number of repetitions, form of stroke), the brain establishes a network of activation centers that are associated only with a consistent pattern of exercise stimulation experienced in the set (if indeed it is performed that way). That patterning will not be established if the quality of repetitions within a set varies (e.g,. as in ascending and descending sets). With each constant repetition in the training set, the brain learns what is required to complete the familiar task and codes that constancy as a set of neuromuscular patterns that are closely associated.

Principle of Specificity

The Principle of Specificity implies that the more yardage performed at target intensities, the greater the transfer of those intensities to target races. Dr. Rushall designed USRPT to yield maximum weekly yardage. This "relevant" volume far exceeds that obtained by conventional methods, in large part because USRPT is self-limiting, allowing for quick recoveries and averting the debilitation and injury of overtraining.. Many activities involved in traditional training are not used in USRPT because they violate the Principle of Specificity as it applies to movement training. Practice session content involves activities that are directly relevant for racing as opposed to many irrelevant activities that are included in traditional training. The full effects of USRPT are not achieved unless technique is developed concurrently. The principle reason behind that association is that both energy supply and technique are specific to particular swimming velocities. Thus, the only way to improve race-specific techniques and the energy that powers them is to train at race-paces.

Short Work Short Rest

There are many benefits that USRPT has over traditional training. When they are reviewed, it is a wonder that anyone would ever try traditional training again (Rushall, 2013).

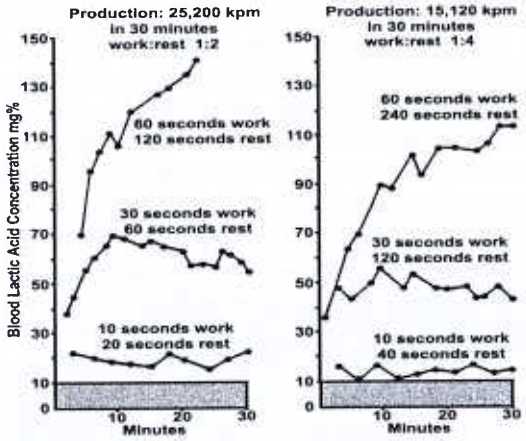

Figure 1. Blood lactate concentrations in two Constant work-rate tasks with the same

Work to rest ratios for different durations. [Adapted from Astrand et al., 1960.]

Figure 1 is an adaptation from the work of Astrand et al. (1960). It displays what happens to lactic acid production while riding a bicycle ergometer with constant work: rest intervals and workloads but the intervals being of different lengths. The left side of the figure illustrates three1:2 work: rest formats. When work is of 60 seconds duration and rest is 120 seconds, the individual increases lactic acid concentration to such an extent that the effort is terminated before the maximum time of 30 minutes has elapsed. That shows if the work duration is sufficiently long enough and as much as double the amount of time is provided for res rest, the ability of an individual to work at a higher level for a full planned duration is impaired. When the duration of the work is reduced to 30 seconds (with 60 seconds rest), the task is completed with a moderate and somewhat stable elevation in lactic acid concentrations. It is likely that such levels are at the cusp of where modification/learning of new technical features of the performance is hindered or prevented when the task duration is reduced further to 10 seconds (20 seconds rest), the task is completed comfortably and seemingly in a submaximal manner. That is an example of what happens in ultra-short training when riding a bicycle ergometer.

Figure 1 (right side) shows lactic acid concentrations when the work to rest ratio was increased to 1:4 for the same task. Lactic acid levels did not reach as high as with the 1:2 format but still the doubling of the rest duration only caused a modest drop. The shortest work duration once again kept lactic acid levels to submaximal effort levels. Increasing the rest periods relative to the work duration had only a moderate effect on the severity of the work. Less work (fewer work periods) were performed in this second example indicating that providing more rest is not much of a hedge against a performer experiencing "hard" exhausting work. The short work and rest periods together provide the opportunity to perform a very large amount of high-intensity work with reduced circulatory and respiratory strain. That is the benefit of the USRPT format.

Who Is Currently Using USRPT?

Recently when Swimming Australia recognized clubs for excellence in young age-group swimmers the two clubs that led the nation, Cherry brook Carlile and Carlile Swimming Club both train USRPT. This is not the first time these clubs have accomplished such a feat and this is only one example of USRPT benefitting younger swimmers. One prominent individual using USRPT is Michael Andrew, the youngest American male swimmer ever to turn professional. Michael's coach/dad, Peter Andrew, has a simple yet powerful advantage over the vast majority of swimming coaches– he stays abreast of the latest relevant research. This knowledge allows Michael to train less than an hour at a time, only focus on dry land training in the summer, never use drills, etc… Coaches would do well to follow their lead in developing evidence-based swimming programs.

Steps to Implement

A major characteristic of USRPT is that some motivational factors are intrinsic to the correct execution and interpretation of the experiences. Those factors change the role of the training experience so that it will not be compared to, equated with, or classed as similar to traditional training. There are several stages that should allow

swimmers to change their expectations for and perceptions of valuable repetition training.

Step 1: Swimmer conduct, skills, and USRPT rules
Step 2: Develop a general outline of the practice
Step 3: Form like-groups of swimmers in every lane for all sets
Step 4. Determine the technique and/or mental skills factors to be concentrated on in each set
Step 5: Determine the stroke(s) to be swum in all sets
Step 6: Determine the repetition distances for the sets
Step 7: Assign the maximum number of repetitions for each set

Table 1. Suggested repetition distances for standard international short- and long-course meets

Repetition Distance	Race Distance 50	100	200	400	800	1500
12.5	X (rarely					
25	x	x	x			
50		X (rarely)	x	X	X	X (rarely)
75			X (rarely	x	x	x
100						x

Table 1 illustrates the repetition distances that are most appropriate for targeted races. Largely, the distance will be determined by the training facility. The most convenient and versatile pool distance is 25 m. That allows 50 m and longer to be repeated with a race-quality turn(s). Long course 50 m pools make it virtually impossible to repeat distances that are less than 50 m and longer if they are not whole number multiples of 50 m. Distances of 15, 25, and 75 m cannot be effectively accommodated because swimmers need to be able to time themselves for each repetition The imprecision of finishing in the middle of a 50 m pool length does not provide the self-reinforcement that is a hallmark feature of the self-control and responsibility built into swimmers' experiences in a true USRPT format. See Step 8 for further discussion about training in long-course pools.

Table 2. A suggested maximum number of target race-pace repetitions and repetition times over particular interval distances with a target race time to produce maximal ultra-short training effects.

Repetition Distance	Race Distance and Target Time 50*	100 (60 secs)a	200 (130 secs)a	400 (270 secs)a	1500 (1050 secs) a
12.5 b	4x6 (maximum intensity) c				
25 b		30 (15 secs) c	40 (16.25 secs) c	40 (16.88 secs) c	
50 b		20 (30 secs) c	30 (32.5 secs) c	30 (33.75 secs) c	40 (35 secs) c
75 b			20 (48.75 secs) c	24 (50.63 secs) c	30 (52.5 secs) c
100 b					25 (70 secs) c

*Possibly only pubertal and masters swimmers.

- The target race time in seconds for that race distance.
- Repetition distances are appropriate for yards or meters.
- The race-pace repetition time for the particular repetition distance that is appropriate for the target race time.

The number of target repetitions in a USRPT set is quite high when compared to traditional training sets. Given that swimmers will not complete the maximum number, what is experienced in the set is as follows. Assume the set being swum is 30 x 50 FS on 50 at 200 m race-pace (30 seconds per rep).

References

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