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PEAKING FOR COMPETITIONS IN ULTRA-SHORT RACE-PACE TRAINING

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Abstract

Change training is the body's response to training stimuli which improve its physical and physiological function. The level of improvement is genetically limited. Once that limit is reached, a different amount of training stimuli is necessary to maintain maximum physical/physiological performance. That change is called maintenance training. If maintenance training is not invoked, the swimmer enters a stage of overtraining which has no value for the benefit of the athlete.

Traditional swimming training has a requirement for a taper prior to important swim meets so that the body can recover from the rigors of training. USRPT prevents excessive stress and is self-regulatory against overtraining. In normal USRPT, athletes are pre-disposed to swimming well but need to alter practices to produce peak performances. The length of time to "peak" is normally one week of altered USRPT. Before very important meets, coaches are encouraged to perform a two-week period of vigilance for excessive fatigue from outside-of-swimming and swimming itself. In the week of training days before the meet; i) the volume of race-pace training is reduced by 50% for two days, ii) morning training sessions are normally abandoned, iii) the next two days further reduce the training stimuli by another 50%, and iv) the time released is filled with an increase in the practice of racing skills. The day before a swim meet in fully-trained USRPT swimmers, little to no swimming is recommended. The major difference between a taper and a peaking routine is that in peaking, the amount of race-pace swimming relative to slow swimming is increased dramatically whereas in tapering, the volume of slow swimming is increased to promote "recovery".

Introduction

Ultra-short Race-pace Training (USRPT) avoids the requirement of a traditional taper before meets. Because USRPT stipulates training repetitions to cease when neural fatigue (i.e., an unrecoverable performance standard) is exhibited, swimmers are not physically depressed for long periods of time as is exhibited in traditional "hard" training (Havriluk, 2013). Instead of having to wait for many months before engaging in a taper (i.e., recovery from chronic physical fatigue), USRPT swimmers should be capable of performing "peak" races at any time after reasonable training performances are exhibited. Consequently, the use of the word "taper", which has a specific meaning for traditional swimming training, is inappropriate for USRPT. "Peaking" is the better term for USRPT when preparing for important or specific swimming meets.

Rushall and Lavoie (May, 1983) discussed stages of training differentiated between "change training", where performances and physiological states are supposed to be altered by the overload experiences to which athletes are exposed, and "maintenance training", which should be timed to commence after the state of maximum physiological change has been achieved. That level is an individual phenomenon because it reflects the inherited capacity of the athlete to achieve a peaked physically-trained state for their sport/event. There is a principle of sport training relating the changeover point from one form of training to the other that is often overlooked in modern training theory and in swimming's traditional training.

> *"This principle states that the amount of work required to produce a change in physical adaptation is much more than the amount of work required to maintain the adaptation once it is achieved."* (Rushall & Lavoie, May 1983, p. 4).

Figure 1 illustrates the relationship between Selye's (1950) *Stress Adaptation Syndrome* (SAS) curve and the concepts of change and maintenance training emphases. **A** indicates that a basic level of physiological adaptation is maintained by everyday activity in the untrained (i.e., not specifically trained) individual. As training is initiated, **B** is the stage where there is a reduction in performance capability that occurs in the shock-reaction phase in the early stages of hard-training. **C** is a generalized curve that indicates the performance changes in the adaptation phase of the stress adaptation curve ("change training"). At this stage performance improvement seems to be directly related to the amount of training that is experienced. **D** indicates the stage of diminishing returns for the physical effort that is expended (i.e., the athlete is approaching the inherited limit of physical-training adaptation). It is at this stage that the coach has to decide whether to switch the training regime to "maintenance training" or to persist with the hard-training load. **E** illustrates the reduction in performance that accompanies over-training. This is usually evidenced by "overuse" injuries or debilitated health. It is initiated when an athlete's capacity to tolerate the training loads that produced change-training responses is exhausted. **F** is the performance curve that results from switching to "maintenance training". The reduction in training load by as much as 50% allows the athlete to maintain peak fitness without over-taxing an individual's physical-adaptation capacity.

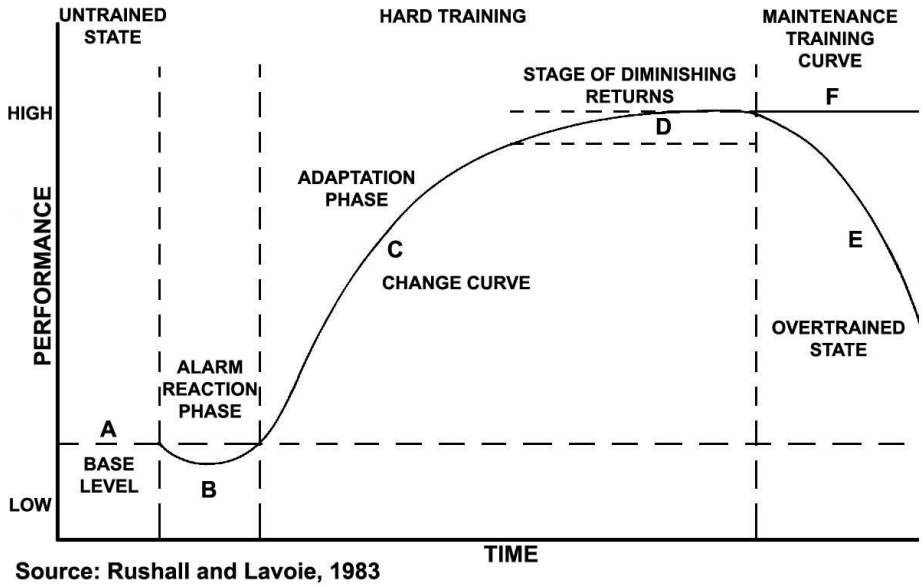

Figure 1. The relationship between Selye's SAS and training possibilities (from Rushall & Lavoie, May 1983).

The above discussion pertains mostly to traditional swimming training. However, some facets are also applicable to USRPT. The change-training loads of USRPT are mostly less than those used in traditional swimming training. The loads of USRPT require swimmers to experience only neural fatigue, the first stage of performance fatigue from which recovery is quite quick (a matter of hours) and is not associated with overstress or overuse. That is because USRPT is self-regulating by requiring training units to cease when race-pace performance standards can no longer be sustained [the brain and the neural system no longer can adequately stimulate the required level of movement efficiency and effort associated with a particular race-pace]. That contrasts to traditional training which requires swimmers to complete the number of repetitions stipulated in a set no matter what the performance level is in the latter part of the set. That extra demand often increases the amount of lactate produced and retained in the training set and diminishes the body's glycogen stores. Lowered glycogen results in the amount of glucose available for performance to become increasingly less which is reflected in poorer performance standards. In USRPT, overtrained states are seldom displayed but when they are it is usually in a hybrid swimming program, the hybridity coming from a mix of traditional training and USRPT.

Since USRPT constantly monitors desirable race-relevant performances it does not distract itself with dubious factors (e.g., lactate tolerance, aerobic adaptation, etc.) that at best are equivocally related to training responses (Montpetit et al., 1981; Pyne, Lee, & Swanwick, 2001; Rowbottom et al., 2001) but not related to eventual "tapered" race-performances. Some physiological tests performed during taper have low to moderate relationships with ensuing competitive performances[1] (Anderson et al., 2003). USRPT acts as a guard against excessive fatigue and consequently, "overuse exhaustion" does not or rarely occurs.

Occasionally, the accumulation of excessive outside-of-swimming stresses (e.g., poor diet, excessive school demands, personal tragedies, etc. -- Rushall, 1981; Rushall & Pyke, 1991) when added to the moderate training stress of USRPT swimming produces a pseudo-overtrained state. It is "pseudo" because the performance degradation is not caused by the stimuli experienced in swimming alone. Thus, the USRPT pseudo-overtrained state differs in causes and nature from traditional training overtrained states. The recovery activities from each different overtrained state would differ. It is to accommodate that difference that this discussion of preparing for competitions in a program of USRPT is entertained. To recognize that difference, traditional training pre-competition recovery is referred to with its traditional terminology, "tapering". In USRPT, pre-competition activities are termed "peaking". In peaking, the focus is on increasing the preparedness of swimmers to race effectively and reducing the possibility of being in an unnecessarily-stressed state at the competition.

Before very important competitions, it is recommended that change training in USRPT be terminated and two stages of maintenance training be started. For lesser competitions, one week of peaking (maintenance) training should be implemented as described below. The two stages of the peaking process have different content and considerations. The first week is a partial maintenance program but the second week is a full reduction in work volume so that swimming specifically in both stroking and skills can be practiced and possibly refined. In the change-training phase, swimmers should be concentrating mostly on technique and the second focus would be on even race-pace training and improvements. If a coach only concentrates on physiological training, performance improvements will eventually cease. However, when technique is concentrated on as well as the physical conditioning that yields improvements in

[1] However, during taper it is too late to take any corrective steps to re-train physiological functions if those functions are important for racing but deficient in testing.

endurance at all race-paces attempted. Across the years continued improvements should be expected.

Among age-group swimmers who seem to be continually growing in step-like stages, technique features have to be repeated several times a year so that new physical factors can be retrained to better accommodate the new stage of developmental growth. Repetitions with technique emphases also foster further refinements of technique features which gradually improve the efficiency with which swimmers progress through the water at race-speeds. While most of the web-site treatments of USRPT focus on physical training, the more important technique development is available in electronic-book form (Rushall, 2013a).

What is the purpose of the above discussion? It simply illustrates that when the frequency or volume of training is reduced by as much as 50% but performance quality is retained, performance standards will not diminish.

Following is a treatment of the time and in particular the first and second weeks (microcycles) of USRPT that should be followed to prepare for very important competitions. The outcome of the peaking process should be that swimmers arrive at the competition site rested and extremely familiar with swimming fast at race-pace.

Beyond Two Weeks before an Important Meet

It is important for USRPT coaches to be very aware of the responses of every individual swimmer. This training format must accommodate the individual differences that exist in a swimming squad/club. Only when each individual experiences success will individual and group motivations rise to levels that affect competitive performances directly. Too often in traditional formats do all swimmers attempt the same or almost the same program. The result of that single focus is that many swimmers are not prepared adequately, do not respond optimally to the training, and experience a lack of improvements in the meet that has been focused on for a considerable number of months (Havriluk, 2013).

Since August of 2013, a large number of swimming coaches have abandoned traditional coaching programs and implemented USRPT. Some coaches have followed a gradual transition which is advised (Rushall, 2013b). Others, and in particular high school coaches, started a complete program very early in January, usually about six weeks before conference championships. Normally one would expect the all-in programs to have very stressful effects on most swimmers. Some of those effects are:

- Training performances get worse as the week's swimming is experienced. Usually, "worse" means the number of successful repetitions in a within-microcycle repeated set diminishes. That contrasts with the expected outcome of improving across a week of training.
- Swimmers exhibit a number of fatigue symptoms that emerge early and remain obvious as in a traditional training program. That usually results in diminished performances and reductions in swimmer enthusiasm.
- Some swimmers never get to an acceptable level of USRPT training. Usually, this is a small minority which includes, among others, "drop-dead" sprinters who are only suited to swimming 50 y/m races and possibly 100 y/m.

The point behind this is for a coach to be aware of how swimmers are responding to USRPT. A basic tenet of USRPT is that all important swimming is adaptive, that is, swimmers only swim well and continually improve. If that does not occur, usually a swimmer's training load will have

to be decreased. How that is done depends on the situation in which training occurs. Consequently, within a USRPT program there will be a variety of numbers of successfully completed training stimuli (Rushall, 2013c). Fatigued swimmers need the demands of their program reduced until positive adaptation and performance improvements occur.

In determining reductions within a program, the coach has to be cognizant of other activities in which a swimmer might be heavily engaged. Determining the priority that swimming has within a swimmer's lifestyle will be necessary if significant performance improvements are expected. When there are other interests that compete with swimming or there is an unfound reason for a swimmer's fatigue and troubled adaptation, the peaking experience should start two weeks before the important competitive experience.

Peaking Week 1 – Phasing from Change to Maintenance Training

In the second-last week before an important swimming meet, a number of alterations in the swimmers' program should be considered. Some of them are:

- Introduce nothing new to be experienced at the meet. By this stage of swimmers' preparations, anything that is different to the previous meet should have been introduced, discussed, and practiced.
- Cease participation in outside-of-swimming activities (e.g., land-training, weight work, running, etc.).
- Cease participation in lifestyle activities that compete for an individual's ability to adapt to swimming at race-pace.
- Be wary of and stay away from individuals who have some form of cold, 'flu', or illness.
- Each swimmer should pay attention to what they eat and drink so that no internal upsets the lead to weakened or dehydrated states occur.
- Suggest and provide opportunities for swimmers to engage in increased night-sleep. Sometimes, that will require cancelling practices on one or more mornings.

There are other stress-reduction alterations that can be made but are situationally or environmentally specific and cannot be accommodated in a general description. The overall outcome of the manipulation of workloads and activity demands in this week should be that performances at the end of the week are equal to or better than the performances at the start of the week.

The training work and lifestyle activity reductions are only a partial transition phase on the way from change to maintenance training. At the end of this week, all swimmers should be swimming well. If at any time during this week one or more swimmers' USRPT set-performances begin to decline allow the swimmers more rest (non-swimming) opportunities. If this week is done correctly, the final week of swimming before the competition should be of high quality because the swimmers are adequately rested.

Peaking Week 2 – Maintenance Training and Skill Emphases

In the week before the swim meet, or more accurately the five days before, maintenance training should be invoked. The first swimming practice of this week should be on Monday and should follow no swimming on at least part of the previous Saturday and none on Sunday at all. If there is competitive swimming on that weekend, then the Monday and Tuesday morning of this second week of peaking should be given off.

Maintenance training requires the level/quality of activity to remain the same (i.e., race-pace) but the volume of the race-pace training should be reduced by 50%. For example, if a set is 30 x 50m

at 200 m backstroke race-pace, the set would be advertised at 15 x 50 m, etc. It is assumed that most swimmers would be able to complete more than 15 repetitions at race-pace before the first failure. If that is so, then swimmers would complete the 15 repetitions successfully at race-pace (a very positive experience). Completing the total but reduced distance is somewhat equivalent to completing the whole race. Its main benefit however, is to increase positiveness/confidence and to have the brain only experience successful training stimuli. For swimmers who cannot complete 15 repetitions successfully, they should be required to complete their best number of repetitions before the first failure. It is assumed that the reduction of overall life-stresses will make their equaling their maximum number of successful completions easier than when under normal excessive life-stresses. However, if that reduced set still appears to be excessively demanding, the coach should require a lesser number of completions without making the task exceptionally easy. The point behind maintenance training is that the quality of performance required at training (race-pace for various events) should be maintained. By the end of this week, swimmers should have overwhelmingly performed only race-pace work and done very little to no slow-pace swimming.

For swimmers who train twice a day, the morning sessions should be discarded and practices only occur in the afternoons so that swimmers train only once per day. If afternoon sessions cannot be scheduled, then a morning swim will have to be substituted. Afternoon sessions only should facilitate each swimmer's day starting rested and with good feelings. The accumulated positiveness of the good mornings should influence what happens in the remainder of the week. In discarding morning practices, the afternoon practice can still accommodate the 50% of morning work plus 50% of afternoon work. That type of training load should be experienced at Monday and Tuesday's practices.

On Wednesday and Thursday, the workload should be reduced further. Only half of the afternoon practice should involve race-pace swimming. The remaining half should involve the practice of skills (e.g., race-specific dives, turns, finishes, and relay changeovers). Between each repetition of these skills, complete recovery should occur. That usually is accommodated by only swimming 25 y/m and walking back to the blocks for dives or waiting until all swimmers have completed the skill repetition before repeating it again. The timing of sub-group and group activities should be such that "good water" conditions prevail for each skill or race-segment trial. The number of trials of each skill should not be small but should be in the vicinity of 10 or more.

In this week the vast majority of the swims should be at the race-paces for the swimmers' events. As much as possible, slow swimming should be avoided. At the end of the week, any reminiscences that occur of swimming should be almost completely, if not all, of specific-race swimming velocities. When recovery work is required, activities should be out of the water or if in the water, should involve activities that bear no relationships to any part of a competitive swimming stroke (e.g., board kicking, back-swimming performing a breaststroke kick, etc.). It should be remembered that recoveries do not have to be swimming or swimming-related. Any activity that requires movement (e.g., walking, easy stretching, etc.) will serve an active-recovery function.

In the practice of skills, each dive, lap+turn, etc. should be done at race-pace. At this stage, no timing is necessary but the swimmers should be aware of the importance of starting a race at race-pace rather than going out too fast too early (and that is what should be practiced). It is an opportunity for them to achieve the pace of the section and skills of a race under their control as a simulation of what is likely to occur the following weekend in each race. Performing the simulations of sections of a swimming event(s) successfully is more important than rushing to

complete as many race-pace swims as possible. Such an emphasis should start to build swimmers' awareness and the importance of the coming meet.

From the swimmers' perspectives they have to be very cautious about falling ill or injuring themselves. This should be stressed by the coach at the beginning and end of each of Wednesday and Thursday's practices.

On Friday, swimmers should be given a choice of having the whole day off or attending a practice session that is half the length of a normal session. Any swimming that is done should be race-quality. If swimmers have to travel this day to a meet, that travel day can be treated as a "rest" day.

Across the two weeks before the swim meet, practices should involve mostly out-of-the-water warm-ups on the assumption that for most meets, and particularly in high school settings, once the competition starts in-water warm-ups will not be possible. A case can be made for out-of-the-water warm-ups being just as effective for positively influencing performances as are in-water warm-ups.

At the end of Thursday's practice, swimmers should know how to warm-up effectively (on-land), the feelings of the correct paces for each of their races, the features to emphasize in turns, the dive, and the finish, and have developed a routine for the quickest post-race recovery (usually on land). Of particular importance is the race-preparation routine that is designed by each individual. Competition and race preparations and race strategies should be incorporated into the swimmers' annual program so that the mental side of competing functions desirably. Why and how to achieve a desirable mental state for competing in swimming has been described (Rushall, 1995).

Swimmers should arrive at the meet venue fully rested, well-acquainted with the movement patterns and sensations of the race-paces for their events, with suppressed familiarity with slow-swimming, and with a clear understanding of what they need to do in warm-ups, warm-downs, and when time-filling activities are required.

Conclusions

The conclusions section of this paper should serve as a summary of the main points about peaking in USRPT programs.

1. Be aware that performance standards will not decline in maintenance training.
2. The reduction in training volumes associated with maintenance training provides added training-time where skills and part-race simulations can be practiced in significant volumes.
3. Two weeks out from the meet, reduce non-swimming activities and sustain swimming work-levels for the whole of the second-last week.
4. Introduce no new activities or mental content in the two-week peaking period.
5. At all times during the peaking activities, a continued emphasis on technique features should be maintained (see Rushall, 2013a).
6. Fully implement maintenance training in the last week before the meet (half the normal volume; sustain the race-pace work intensities).
7. In the last week, no morning sessions, unless afternoon sessions cannot occur.
8. Training work is further reduced on Wednesday and Thursday and more skill practices and part-race simulations increased to use the released time wisely.

9. In the two weeks considered here, swimmers should know everything to do at the competition venue. Activities, such as dry-land warm-ups, race-strategies, dry-land warm-downs, etc., should be devised and practiced at least in the last two weeks. If they have been developed for a previous meet, then on this occasion those plans should be revised and altered to be more effective.
10. Swimmers should attend the meet rested, very much in tune with the race-pace swimming that will be required of them, and have warm-up, recovery, and time-filling activities well-planned.

The full-peaking process is appropriate for very important meets. For lesser meets, mostly the last week of the peaking process will be sufficient for swimmers to perform very well. The coach has to decide how much resting and "tuning-up" is required for the competition in question.

The guidelines presented here will not satisfy every individual or situation, but they should be applicable to most occurrences of important swim meets. It is not possible to write suggestions for every situation. When unusual circumstances arise, coaches will have to cope with the situation as best as possible. Any learning that occurs from handling unexpected situations can be chalked up to "experience".

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