SWIMMING SCIENCE BULLETIN

Number 40a

REVOLUTION IN SWIMMING:

ULTRA-SHORT RACE-PACE TRAINING (VERSION 2.0)

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This is an overview for the busy coach, swimmer, or parent, of Brent Rushall's seminal treatise, Swimming Energy Training in the 21st Century: the Justification for Radical Changes, published in the Swimming Science Journal — Swimming Science Bulletin 39 (*http://coachsci.sdsu.edu/ swim/ bullets/energy39.pdf*).

Dr. Rushall, competitive swimming's best mind, cites reputable scientific studies to elucidate the unique energy demands of swimming — and then presents a new form of race-pace training that is exclusive to those demands.

Conventional training for swimmers is outmoded. It is based largely on the physiology of runners and lacks adequate instruction in race-specific physical and mental skills.

Unlike runners, swimmers dive from a height into cool, buoying water. Turns break up their races. Their legs work less intensely than their arms, and their arms can relax between propulsive movements. Runners start from a standstill, onto an oval track that puts them at the mercy of gravity and heat. In sprints, their arms work nearly as hard as their legs, and their legs cannot relax between propulsive movements.

Hence, the energy demands of swimmers differ greatly from runners (and athletes in other "cyclic" sports). This is especially true of the two anaerobic systems, the alactacid (ATP-CP) and the lactacid. These systems can operate far beyond their usual 10 and 45 second limits because; 1) creatine phosphate (CP) is replenished in the intensely working arm and shoulder muscles as they relax between propulsive efforts, and 2) lactate from the arms is cleared in the less intensely working, larger muscles of the legs. The effect is to keep lactate levels low. (These processes are stymied, however, when swimmers go out too fast or kick too hard.)

Dr. Rushall created "Ultra-short Race-pace Training" (USRPT) to exploit this unique physiology. He did so on the basis of scientific studies validating the Principle of Specificity in swimming-studies demonstrating that the energetics and technical skills of a particular race are specific to the velocity of the race. Accordingly, USRPT excludes anything, like kickboard kicking, that is not race-specific for stroke, distance, pace, technique, and mental readiness. The sets comprise serially repeated short sprints, on 15 to 20-second rest intervals, typically 25s at 100 race-pace, 50s at 200 race-pace, and 100s at 1500 race-pace.

To illustrate, what does the following high-intensity set have in common with USRPT?

[2 x 200, the 1st 200 as freestyle and the 2nd 200 as breaststroke, each 200 broken into full-bore sprints of 25, 25, 50, 50, 25, and 25, on rest intervals of 30 sec after the 25s, 45 sec after the 50s, and 60 sec between the 200s]

Not a thing! The pace is non-specific, the repeats are too few to solidify skills, and there is a comingling of strokes, work-to-rest ratios, and energy demands. Furthermore, there is no specified technical or mental focus. This is what Dr. Rushall calls a mixed set, and as he likes to say, “Mixed training produces mixed results.”

Now look at another set.

[30 x 25 freestyle at 100 freestyle race-pace on 15-second rest intervals, holding a low, streamlined head position while implementing racing strategies and imagining that one’s fiercest rival is in the adjacent lane.]

That’s USRPT![1]

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. Swimmers must stop a set when they fail to meet their prescribed paces and thus cannot succumb to lactate-fatigue and glycogen depletion, which require at least 48 hours of recovery.

Some think that USRPT neglects the aerobic system. On the contrary, USRPT exerts nonstop, maximal stress on every oxygen-using source of energy. Its format of short repeats and rests creates a training stimulus that 1) energizes aerobic, slow-twitch muscle fibers beyond the capability of standard aerobic sets; 2) converts a substantial fraction of anaerobic, fast-twitch fibers to the use of oxygen; and 3) binds oxygen to hemoglobin and myoglobin. The overall training effect is to maximize not only base aerobic capacity but also the subsuming “oxidative capacity.” The result is greater speed endurance ─ the ability to bring home a race before acid build-up takes its toll.

Unlike running, swimming requires sophisticated technique. After a point, further speed can come only by way of sharpened skill. Despite the originality of USRPT’s training format, its heart and soul is the perfection of technique. Every one of its many rest intervals is devoted to focused coaching of physical and mental skills.

USRPT is nothing if not efficient.

And it has been shown to be of particular benefit to children.

A special note to the reader: If you were enquiring enough to come this far, I encourage you to read Dr. Rushall’s short energy paper, and then, if you are interested in applying his ideas or understanding the science behind them, to delve into the longer treatise and the specialized papers in the Swimming Science Bulletin (*http://coachsci.sdsu.edu/swim/bullets/table.htm*)*. This is swimming’s best mind reaching out to the rest of us. Be patient -- and learn.*

Endnote

[1] One of Dr. Rushall's earlier books, titled *Personal Best: A Swimmer's Handbook for Racing Excellence* (*http://brentrushall.com/personal/index.htm*), described how to implement effective racing strategies. For example, in the USRPT set just presented, if the swimmer can complete at least 16 repetitions, the following strategies will simulate the target 100 freestyle.

1. The first four 25s employ strategy for the first length of the race, when fatigue is minimal but the body is rapidly adapting to high-level, controlled effort.
2. The next four 25s (#5-8) employ strategy for the second length of the race, where maintaining an even pace is paramount.
3. The next four 25s (#9-12) employ strategy for the third length of the race, the most challenging, when fatigue must be suppressed in the effort to maintain an even pace.
4. The final four 25s (#13-16), and any additional repetitions, employ strategy for the final length of the race, when every remaining resource must be tapped in the effort to finish as fast as possible, with a precisely executed drive to the wall.