Olympic Preparation of a World-Class Female Triathlete

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Detailed accounts of the training programs followed by today’s elite triathletes are lacking in the sport-science literature. This study reports on the training program of a world-class female triathlete preparing to compete in the London 2012 Olympic Games. Over 50 wk, she performed 796 sessions (303 swim, 194 bike, 254 run, 45 strength training), ie, 16 ± 4 sessions/wk (mean ± SD). Swim, bike, and run training volumes were, respectively, 1230 km (25 ± 8 km/wk), 427 h (9 ± 3 h/wk), and 250 h (5 ± 2 h/wk). Training tasks were categorized and prescribed based on heart-rate values and/or speeds and power outputs associated with different blood lactate concentrations. Training performed at intensities below her individual lactate threshold (ILT), between the ILT and the onset of blood lactate accumulation (OBLA), and above the OBLA for swim were 74% ± 6%, 16% ± 2%, 10% ± 2%; bike 88% ± 3%, 10% ± 1%, 2.1% ± 0.2%; and run 85% ± 2%, 8.0% ± 0.3%, 6.7% ± 0.3%. Training organization was adapted to the busy competition calendar (18 events, of which 8 were Olympic-distance triathlons) and continuously responded to emerging information. Training volumes were 35–80% higher than those previously reported for elite male and female triathletes, but training intensity and tapering strategies successfully followed recommended best practice for endurance athletes. This triathlete placed 7th in London 2012, and her world ranking improved from 14th to 8th at the end of 2012.

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Olympic-distance triathlon (1.5-km swim, 40-km draft-legal bike leg, 10-km run) was introduced as an Olympic event in Sydney 2000. In spite of the growth in scientific interest,1 very little information is available about the training practices of elite triathletes,2 particularly since a change in racing format in 2009, replacing a single World Championship race for a series of events known today as the World Triathlon Series (WTS). The series doubles as an opportunity for Olympic qualification, in which athletes need to perform consistently to score points to be eligible for Olympic selection. This scheduling has direct implications for the planning and organization of training.3,4 The purpose of this study was to report on the training program of a world-class triathlete during her London 2012 Olympic campaign.

Methods

The featured triathlete was 33 years old at the beginning of the 2011–12 season and turned 34 three weeks before the 2012 Olympic Games. She had been involved in elite triathlon since 2001 and had competed in Athens 2004, where she placed 24th, and Beijing in 2008, where she placed 28th. Her world ranking at the start of the season was 14th. Her height was 1.60 m, body mass 47.4 kg, and sum of 7 skinfolds 37.2 mm 5 weeks before the Olympic event. A detailed training log kept by the athlete’s coach and updated daily with the athlete’s feedback was used for this report. Training intensities were determined on the basis of laboratory and/or field physiological testing, and they were adjusted as needed, based on further testing and continuous feedback from the athlete. Swim-training tasks were categorized and prescribed based on speeds associated with different blood lactate concentrations and/or specific times to swim a distance; cycling sessions were based on heart-rate values and/or specific power outputs; and run sessions were also based on heart-rate values and/or specific times to run a distance.

Training-intensity zones corresponding to swim, bike, and run intensities below the athlete’s individual lactate threshold (ILT), between the ILT and the onset of blood lactate accumulation (OBLA), and above the OBLA for each modality were determined. To compute total training load, expressed in arbitrary units (a.u.) and not including strength training, swim distance was first converted to hours by dividing it by 3.4 km/h; swim, bike, and run minutes spent at each intensity zone were then multiplied by the weighting factors 1, 2, and 3, respectively.5 The triathlete gave written informed consent for publication of the results of this study.

Results

The athlete’s Olympic campaign started in November 2011, after 3 weeks of complete rest. The training data reported here are based on 796 sessions performed over 50 weeks comprising 303 swim, 194 bike, 254 run, and 45 strength-training sessions. Weekly training consisted of 16 ± 4 (mean ± SD) sessions, of which 6 ± 1 were swim, 4 ± 1 bike, 5 ± 2 run, and 1 ± 1 strength training. The athlete had a total of 21 days of full rest over the 50 weeks of training. Swim, bike, and run training volumes (Figure 1) were, respectively, 1230 km (25 ± 8 km/wk), 427 h (9 ± 3 h/wk), and 250 h (5 ± 2 h/wk). Weekly swim, bike, and run training loads were, respectively, 588 ± 206, 585 ± 233, and 364 ± 136 a.u. The total training load undertaken by the athlete each week can be seen in Figure 2. Swim training performed at intensity zones below ILT, between ILT and OBLA, and above OBLA were 74% ± 6%, 16% ± 2%, 10% ± 2%; bike training 88% ± 3%, 10% ± 1%, 2.1% ± 0.2%; and run training 85% ± 2%, 8.0% ± 0.3%, and 6.7% ± 0.3%. Weekly training-intensity distribution is displayed in Figure 3.
Figure 1 — Weekly training volume performed by the athlete over the 50-week training and competition season. Note that swim volumes are expressed in kilometers, whereas bike and run volumes are expressed in hours.
Figure 2 — Total training load, expressed in arbitrary units, over the 50-week training and competition season. The boxes over the horizontal axis indicate competitions, and the numbers within, competition placing. White boxes represent low-priority competitions not contributing to world rankings. Gray boxes represent high-priority races contributing to the world rankings. The black box represents the highest-priority race of the season: the London 2012 Olympic Games.
Figure 3 — Training-intensity distribution, expressed as a percentage of total training volume (including swim, bike, and run volumes), over the 50-week training and competition season. Black bars represent training intensities below the athlete's individual lactate threshold (ILT); white bars represent training intensities between the ILT and the onset of blood lactate accumulation (OBLA); and gray bars represent training intensities above the OBLA.
The athlete spent 20 weeks in a dedicated camp setting (training and/or competition venue away from her home base) before the London 2012 Olympic event, held on week 39 of the program, and then 2 more weeks before the Grand Final of the WTS held in Auckland, New Zealand, on week 50. Although the athlete had used natural and simulated altitude extensively in the past, this training strategy was not incorporated into her program during the Olympic campaign. Proactive recovery strategies were limited to stretching exercises and massage once every 2 to 3 weeks. Racing over the 50-week period consisted of 2 sprint-distance duathlons (run-bike-run), 6 sprint-distance triathlons, 8 Olympic-distance triathlons, 1 sprint aquathlon (run-swim-run), and 1 mixed relay triathlon, for a total accumulated competition time of 26 hours, 14 minutes, and 35 seconds (14 h, 0 min, 1 s before London 2012). Training tapers were carried out in the lead-up to the Sydney WTS and European Championships (weeks 23 and 24), Madrid WTS (week 29), Olympic Games, and Auckland WTS Grand Final. The 3-week, 3-phase taper that preceded the Olympic Games was characterized by an initial 1-week reduction in swim, bike, and run volumes of 38%, 40%, and 24% with respect to the preceding 5-week mesocycle; a small increase over these swim and bike volumes of 11% and 25% but a further decrease in run volume of 16% during the second week; and a final week consisting of a reduction of 58%, 63%, and 56% with respect to the previous mesocycle. The triathlete placed seventh in London 2012, and her world ranking improved to eighth at the end of 2012. All her competition outcomes (placements) are shown in Figure 2.

Discussion

Traditional training periodization provides coaches and athletes with basic guidelines for structuring and planning their training, but a major limitation of this approach is its inability to elicit multiple peaks for repeated racing over the competitive season. Recently, it has been suggested that training prescription should be realigned with contemporary elite practice and modern conceptual models based on science—against which experiences, observations, data, and decisions are contextualized—and effective management of continually emerging information. This was the training approach followed in the current case.

Maintaining a high fitness platform throughout the season was necessary to ensure high world and Olympic rankings, permitting the athlete to select a good starting position on the diving pontoon at the Olympic Games. To achieve this aim, mean weekly swim, bike, and run volumes were, respectively, 21%, 1%, and 32% higher than the previous season; 32%, 15%, and 61% higher than the Beijing 2008 season; and 46%, 20%, and 19% higher that the Athens 2004 season. They were also 80%, 43%, and 35% higher than those previously reported for elite male and female Olympic distance triathletes. Peak weekly training loads were similar to those estimated with a similar quantification method for professional cyclists during the first week of a 3-week road-cycling race. The limitations of this method of quantifying training loads and assessing internal training stress have been previously highlighted, but a recent investigation in professional cycling showed strong correlations with the widely accepted method of session rating of perceived exertion.

Training-intensity distributions were consistent with best practice to maximize adaptation at acceptable levels of physiological stress. This approach allowed the athlete to maintain a relatively high competitive level throughout the entire season, and multiple fitness and performance peaks were achieved by means of planned training tapers in the lead-up to key international events. Reductions in training volume were well within the recommended values for an efficient taper.

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References
