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EDITORIAL

Triathlon Transition Tests: Overview and Recommendations for Future Research.

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Overview

Triathlon performance is influenced by a competitors' discipline specific ability, across all three of its sub-events, relative to who else is in the race field. Residual fatigue and or altered movement patterns, as a result of the preceding swim and cycle, may lead to a competitor completing the run in less than his/her optimal manner. This may then impact on his/her overall race result (Cala et al., 2009; Vleck et al., 2008). The shorter the race distance and the higher the exercise intensity that is required, the more important a good cycle-to-run transition (T2) is likely to be to the athlete's overall placing (Millet and Vleck, 2000; Vleck, Bürgi & Bentley, 2006; Vleck et al., 2008).

In this editorial, we consider (T2) to be "the period from the last kilometre of the cycle section through to the end of the first kilometre of the run." We refer our readers to Millet and Vleck (2000)'s review of the physiological, biomechanical, and sensory affects of the Olympic cycle to run transition on junior and Elite triathletes, and focus here on the currently available tests for "T2 ability."

Most of the tests in the literature (see Bibliography) are laboratory based. That of Chapman's group (Chapman et al., 2009; Bonacci et al., 2010, 2011a, b) appears to be able to distinguish, at the Senior Elite level, between neuromuscular "adaptors" vs. "non-adaptors" to T2. The Millet "run-bike-run" (RBR) laboratory test (Millet et al., 2000; Millet, Millet & Candau, 2001; Millet, Dréano & Bentley, 2003; Millet & Bentley, 2004) has been demonstrated to be sensitive both to differences in T2 adaptation between both genders, between short-distance (SD) and long-distance (LD) specialists, and between Senior and Junior National Squad athletes. Moreover, the results obtained with it appear to mirror those seen in World Cup competition (Vleck et al., 2008). Additionally, the Millet RBR test, and its modified (non-elite) version (Bentley et al., 2005; Alves, Vleck & Alves, 2008) appear to be the only laboratory-based protocols for which validation against competitive race (or time-trial, Hue, 2003) performance has been attempted. Only Bentley et al. (2005), appear to have also investigated whether the results on a given T2 test are reproducible.

To date, only 2 field-based T2 protocols (Vleck et al., 2005; Diaz et al., 2008) implemented with National Squads, appear to be available. In Portuguese Squad seniors, no significant differences in blood lactate values were observed within an incremental track-based lactate test, after a 40-km cycle time-trial, from the control condition (Vleck et al., 2005). Neither the extent to which test results may have been sensitive to training differences (Vleck, 2010), nor the validity of the training zones that were determined from the run test, was assessed. In a Spanish study (Diaz et al., 2008) - differences between the best male under-16 year olds and Senior Elites in time to complete a 3km track run at maximal self-selected speed (after 30 min of constant load cycling at the power output corresponding to ventilatory threshold) were noted over the control condition. Both this, and a difference in the younger athletes' pacing (Le Meur et al., in press) from the Seniors, persisted over 2 consecutive seasons. No validation of the test results against race performance, however, has been carried out.

Variation also appears to exist in the accessibility of the various T2 tests to various athlete age, event distance and or ability groups. The modified Millet laboratory test (Bentley et al., 2005), for example, with its set (cycle and run) workloads may prove more appropriate for adult age-groupers than the original test, but still too challenging for non-elite juniors (Vleck et al., unpublished observations).

Nor do we know, for most T2 protocols, to what extent the strength of any relationship between test measures and competitive performance might vary between the various race distances and formats that can be applied as an athlete progresses through his/her competitive career. The Spanish field test (Diaz et al., 2008) may be used with both juniors and Seniors-but the results obtained with it may be less useful in Seniors-who rarely race, and may have difficulty optimising their pacing during, a 3-km run. The extent to which a specific T2 protocol may be usefully enforced on a longitudinal basis, in a given athlete, is unknown.

Perspectives

Both the demands (Bentley et al., 2002) of, and the mechanisms of adaptation to the multi-discipline training (Millet, Bentley and Vleck, 2009) that is involved in, the triathlon indicate that "triathlon specific" cycle-run transition tests may prove a useful adjunct to the test battery of the (potential or actual) Elite. Either T2 tests that are (sprint, SD or LD) distance, and or ability specific, need to be designed, or the extent to which the relationship between test results and performance varies with competition distance and format needs to be ascertained. The validity and reliability of T2 protocols needs examination. Determination of the sensitivity of T2 protocol(s) to longitudinal change in cycle-run adaptation status (Bonacci et al., 2011a), is required.

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