"Let them spin" - cadence in triathlon.

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Introduction
Since the Sydney Olympic Games in 2000 drafting during the cycling leg in Olympic distance triathlon is legal, thus race dynamics and the influence of cycling on the overall performance has changed. Moreover, race distances like team-medleys and sprint-distances in the World Triathlon Series or World Championships have increased this tendency. While the swim and run leg have the greatest influence on overall performance (Vleck et al., 2006) the pedaling cadence during cycling could have a beneficial effect on running performance.

The influence of pedaling cadence is well examined in cycling and the results show that athletes choose cadences similar to the energetically optimal cadence during a time-trial (Brisswalter et al., 2000). Further investigations in the triathlon during constant power output showed no performance enhancing effects of different cadences in cycling during a subsequent 3km run (Bernard et al., 2003).

The aim of the present study was to evaluate the effects of different pedaling cadences on metabolic and respiratory parameters during cycling and subsequent running performance in well trained triathletes in order to determine the individual optimal pedaling cadence or at least to detect general tendencies concerning a performance-enhancing pedaling cadence in triathlon.

Methods
Nine well-trained triathletes (age: 23.3 ± 2.45 years, height: 181.2 ± 5.83 cm, weight: 70.6 ± 3.84 kg, body fat: 11.23 ± 1.73%) competing in the 1/2. German Triathlon Bundesliga participated in the study. At the beginning of the study two laboratory tests were conducted: An incremental cycling (start: 70 W, increase: 40 W, step: 5 min) and running (start: 2.0 m/s, increase: 0.4 m/s, step: 5 min) test during which blood lactate, heart rate, respiratory values, RPE and power output were recorded. On each of three different days the participants performed one of three cycle-run sessions. The three cycle- run sessions consisted of 28 min cycling followed by 3 km of running and investigations in the triathlon specific running are necessary to support the present results and to research the cadence specific influence on oxygen consumption during running in triathlon as well as the effect on overall performance.

One major limitation could be the variance of cadence during cycling in competition. Short time efforts, accelerations after turn-arounds and tactics influence power, speed and cadence in an enormous way. Concluding practical implications of the present results, the athletes should be advised to choose their cadence freely.

Results
A significant increase in blood lactate and heart rate was observed during the race simulating cycling test. Blood lactate and heart rate during the cycling performance at 60rpm was significant lower compared to cadences of 100rpm or FCC. No significant difference in blood lactate or heart rate was measured between the running performances.

During the run, however, no pedaling cadence induced a reduction in oxygen consumption and heart rate. But a significant decrease in respiratory quotient while pedaling with low cadences was found. Neither at cycling nor at running, the rate of perceived exertion, the stride rate or the running economy show a cadence induced positive influence.

Discussion
The current findings correspond with the findings of Bernard et al. (2003) and Brisswalter et al. (2000). The current study was able to prove significant effects of cadence on blood lactate levels during cycling, but still no general references about the optimal cadence in triathlon competitions can be made. Additionally it stays debatable if the current findings influence the overall time in a triathlon competition. Further studies especially collecting data during triathlon competitions of the sprint distance are necessary to interpret the current findings.

In summary, it can be stated that a low pedaling cadence (60 rpm) reduces the cardio - pulmonary load during the cycling stage and provides beneficial conditions for the following running bout. Further investigations of the triathlon specific running are necessary to support the present results and to research the cadence specific influence on oxygen consumption during running in triathlon as well as the effect on overall performance.

References


