PURPOSE: To assess the relation between training load and performance improvement in a homogeneous group with a differentiated training programme.

METHODS: Training data from 11 recreational cyclists (aged 38.5 ± 5.9 yr) were collected during a 12-week training period. Before and after the training period, subjects underwent a laboratory incremental exercise test with lactate measurements. Baseline metrics were the anaerobic lactate threshold (ALT), the anaerobic lactate threshold (ANLT) and the maximum power output (MPO). Internal training load was calculated using individualized TRIMP (LuTRIMP), Lucia TRIMP (LuTRIMP), Banister TRIMP (bTRIMP) and Edwards TRIMP (eTRIMP). The distribution of training load was calculated as the time in zone 1 (Z1), zone 2 (Z2) and zone 3 (Z3), being the zone below the ALT, between ALT and ANLT and the zone above ANLT respectively.

RESULTS: 353 training sessions were analysed. All metrics improved (p < 0.01) from baseline to posttest (ALT from 161.4 W ± 20.8 to 179.4 W ± 25.6; ANLT from 221.6 W ± 25.8 to 240.4 W ± 25.0 and MPO from 273.5 W ± 23.7 to 290.9 W ± 26.0) All TRIMP calculations correlated very highly with one another (r = 0.88 – 0.99, p < 0.01). No significant correlations (p ≥ 0.05) were found between the mean weekly TRIMP, for every calculated method, and the improvement in fitness variables. When looking at the distribution of training time, total minutes in Z2 correlated largely with the progression in the ANLT (r = -0.63, p = 0.02). The percentage of time trained in Z1 correlated with progress in MPO (r = 0.58, p = 0.03), percentage in Z2 correlated negatively with MPO (r = -0.74, p < 0.01) and percentage in Z3 shows a relation with the progress in ANLT (r = 0.56, p = 0.04). When combining the percentage and total time in each of the training zones in a regression analysis, there is a stronger relation with the improvement in ALT (r = 0.29), in ANLT (r = 0.74) and MPO (r = 0.81).

CONCLUSION: Directly relating training impulses with training progression should be done with caution. Distribution of training time over the intensity zones should always be accounted for. It is improbable that one metric could directly relate to the overall progression of an athlete.
The Wattbike is an electromagnetically and air-braked cycle ergometer that has been used for talent identification and elite development by British Cycling. It is paired with advanced software that includes a 3-min aerobic test meant to provide maximum minute power (MMP) and predict maximal oxygen consumption (VOpeak).

**PURPOSE:** To investigate the accuracy of the prediction by the Wattbike, and to determine the ability of the 3-min test to elicit a true VOpeak.

**METHODS:** This study included 13 cyclists (3 women, 10 men) with varying degrees of experience, a mean±SD age of 29.2±10.0 years, height of 178.7±8.3 cm, and mass of 75.1±12.5 kg. At the first lab visit, a 10-min self-paced VOpeak test (SPV) was performed. Subjects were asked to complete a warm-up followed by the 3-min test. The goal of the 3-min test, as stated in the manufacturer’s instructional video, is to maintain as high of a power output as possible for three full minutes without a drop in performance. Subjects were shown the video, so that they were fully aware of the protocol and requirements. They were free to alter pedal cadence and resistance throughout the test. A metabolic cart was used to collect expired gases. 15-breath moving averages were calculated and the maximal value for each variable was used for analysis [VO2, respiratory exchange ratio (RER) and ventilation (Ve)]. A one-way repeated-measures ANOVA was used to compare the VOpeak (in ml·kg⁻¹·min⁻¹) given by the Wattbike to the values provided by the metabolic cart for the SPV and the 3-min test. Dependent t-tests were used to compare the heart rate (HR), Ve and RER between the two tests. To determine if the tests were truly maximal, the following criteria were used: HR within 10 bpm of apHR given by the Wattbike, and Ve and RER significantly less than Monark (10.7 ± 1.0 vs. 12.4 ± 1.9 W·kg⁻¹).

**CONCLUSIONS:** These results show that the Wattbike 3-min test elicited a VOpeak value similar to that of the SPV, and it was able to successfully predict VOpeak.

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**METHODS:** LT data were analyzed from 41 athletes [18 trained cyclists (15 males [m], 3 females [f]) and 23 female soccer players (7 m, 16 f)]. Tests were performed on a cycle ergometer using 5 min stages starting at 70 W (m)/50 W (f). Work rates were increased by 25 W (m)/15 W (f) for the first 3-4 stages, and by 15 W (m)/10 W (f) for the last 2-3 stages. Blood samples were obtained in the last min of each stage, and blood lactate was analyzed using a Lactate Plus device. For determinations of LT, 3-trained investigators independently analyzed the plots.

**RESULTS:** In cyclists, LT using BREAK and +1 mmol (247±48 W vs. 250±50 W; p=0.52) were not different but were significantly lower than that obtained with OBLA (270±54 W). Correlational analyses indicate that LT using BREAK and +1 mmol were strongly related (R=0.99). Associations were strong between +1 mmol and OBLA (R=0.96) and between BREAK and OBLA (R=0.96). In non-cyclists, LTs obtained with all 3 methods were significantly different. In non-cyclists: 125±3 W; +1 mmol: 130±11 W; OBLA: 134±13 W; all p<0.04, although BREAK and +1 mmol were strongly associated (R=0.98). The associations between different LT methods were much weaker in non-cyclists (1 mmol and OBLA: R=0.90; BREAK and OBLA: R=0.85) compared with cyclists.

**CONCLUSIONS:** Break point and +1 mmol L⁻¹ methods yield comparable results in trained cyclists but not in non-cyclists. Caution should be used when interpreting LT results obtained from different determination methods.