UNIVERSITY *of* MONTEVALLO

EXERCISE & NUTRITION SCIENCE

Comparison of Maximal and Anaerobic Capacities Among Trained Collegiate Mountain Bike Cyclists

Benjamin Boldt[1], Shawn M. Mitchell[1], Curtis Fennell[1], Sarah Hines[1], Keegan Rafferty[1], Randi Henderson-Mitchell[2], Harshvardhan Singh[3], Robert Herron[1], Gary Hunter[3]
The University of Montevallo[1]
The University of Alabama[2]
The University of Alabama-Birmingham[3]

PURPOSE

Competitive collegiate mountain biking includes subdisciplines of cross-country, short track, downhill, and dual slalom. These subdisciplines incorporate the use of all three energy systems during competition, and depending on intensity and duration, will determine which energy system predominates during competition. The purpose of this study is to compare outcomes from two maximal tests measuring two different energy systems among athletes that participate in both anaerobic and aerobic based cycling competitions.

METHODS

Eight collegiate highly trained competitive cyclists (6 men; Mean age ± SD; 19 ± 1.5 years; Table 1 provides anthropometric measures) participated in two testing sessions, with each test measuring a value for maximal capacity (Table 1). For the first session, participants performed a maximal aerobic capacity (i.e., VO2max) test with incremental stages beginning at 100 watts and an increase in 50 watts every two minutes until 50 revolutions per minutes could not be maintained. A Parvo Metabolic Cart was used to measure maximal aerobic capacity. During the second session, participants performed a 30-second Anaerobic Wingate Test (WAnT) on a Velotron Cycle Ergometer (SRAM) with a resistance load set at 10% of the participant's bodyweight. The tests consisted of a brief 2-minute warm-up at 100 watts, which was followed by a 20-second lead-in time to the test performed at 150 watts. Thereafter, an 8-second countdown was given and participants were verbally encouraged to begin pedaling as fast as possible. At the end of the 8-seconds, the load was engaged for the 30-second test duration. While instruction and familiarization were given for both maximal tests, participation in the present study was the first maximal testing experience for all participants on both tests.

RESULTS

Analysis of the data revealed a statistically significant (p = .03) strong to very strong correlation (r = .756) between Maximal Aerobic (Mean ± SD; 51.65 ± 9.9 ml/kg/min) and Anaerobic Capacities (Mean ± SD; 10.56 ± 1.7 W/kg).

Participant	Height(cm)	Weight(kg)	Bodyfat(%)	Anaerobic Capacity(W/kg)	Aerobic Capacity(ml/kg/min)
1	177.01	81.3	12.3	12.1	54.2
2	184	101.9	21.9	8.1	41.8
3	181.99	79.1	8	11.1	53
4	171.5	73.1	10	11.6	60.4
5	159	55	21.6	10.1	48.7
6	172.01	73.6	11.5	11.5	44.5
7	178	69.8	5.6	12.1	69.8
8	151.99	48.3	15.9	7.9	40.8

CONCLUSIONS

Results demonstrate a trend suggesting that participants had high levels of capacity for both anaerobic and aerobic energy systems.

PRACTICAL APPLICATIONS

When working as a strength and conditioning professional with athletes participating in both anaerobic and aerobic based events, it appears both energy systems can effectively be trained while maintaining high outcome values for each system.

REFERENCES

Kirkwood, L.A., Ingram, L.A., Cunningham, J., Malone, E., and Florida-James, G.D. Physiological characteristics and performance in elite vs non-elite endure mountain biking. *J. Sci. Cycling*. 6(2): 13-21, 2017.

Lee, H., Martin, D.T., Anson, J.M., Grundy, D., and Hahn, A.G. Physiological characteristics of successful mountain bikers and professional road cyclists. *J. Sports Sci.* 20:1001-1008. 2002.

Novak, A.R. and Dascombe, B.J. Physiological and performance characteristics of road, mountain bike, and BMX cyclists. *J. Sci. Cycling.* 3(3):9-16. 2014.

Gregory, J., Johns, D.P., and Walls, J.T. Relative vs. absolute physiological measures as predictors of mountain bike cross-country race performance. *J. Strength Cond. Res.* 21(1): 17-22. 2007.