

Effect of two high intensity interval-training, models calibrated with time until exhaustion at 100 % of the maximal aerobic velocity on hematological and biochemical parameters.

Bouguerra L³, Ben Abderrahman A^{1,2}, Rhibi F^{4,5}, Tabka Z³, Prioux J⁵

1High Institute of Sport and Physical Education, Ksar-Saïd, Manouba University, Tunisia.

2Research Laboratory “Sports Performance Optimization” National Centre of Medicine and Science in Sports (CNMSS), Tunis, Tunisia.

3Laboratory of Cardio-Circulatory, Respiratory, Metabolic and Hormonal Adaptations to the Muscular Exercise, Faculty of Medicine Ibn El Jazzar, Sousse, Tunisia

4Faculty of science of Bizerte, University of Carthage, Tunisia.

5Movement, Sport, Health and Sciences laboratory (M2S).UFRAPS, University of Rennes 2-ENS Rennes, Av. Charles Tillon, 35044 Rennes cedex, France²

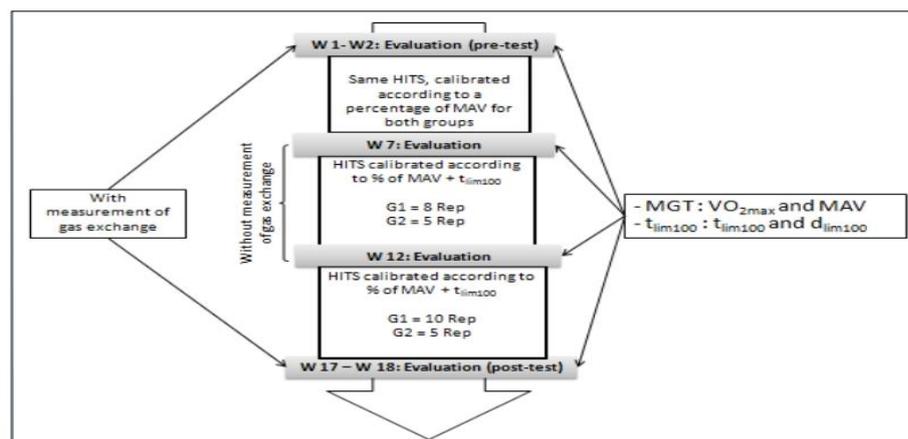
BACKGROUND – the combination of high intensity interval training (HIT), calibrated in reference to time until exhaustion is common mainly to develop the anaerobic performances .

However this study is the first one witch examine the effect of 18 weeks of training (with 12 weeks of HIT) describing in twenty male high-level middle and long distance runners the chronic effects on hematological, biochemical and the physiological adaptation of a gradual increase in the number of repetitions HITS calibrated to time 100 .

PURPOSE – we aimed to analyze the effect of intermittent training program calibrated in reference to t_{lim10} using gradual increase in repetitions per high-intensity interval training session on hematological, biochemical aerobic performances and physiological adaptations.

METHODOLOGY – Twenty male high-level middle and long –distance runners voluntarily participated in this study .They were divided in two groups: Training group with progressive increase in the number of t_{lim100} repetitions (G2; n=10). The study lasted 18 weeks and the total duration of the training period was 12 weeks of high – intensity interval training program (TWHITP) .The subjects performed 12 tests: 4 maximal graded test (MGT) ,4 time to exhaustion at 10./. of maximal aerobic speed (MAS) (t_{lim100}) and 4 running exercise (2*5000M AND 2* 10000M) .Before and after training 10 ml of venous blood was collected from the antecubital vein for the determination of plasma concentration of insulin, cortisol and growth hormone at rest after warm-up and 3 min after the end of t_{lim100} and rest immediately at the end of the MGT and after 5-10-20-30 min of passive recovery.

Figure1. Experimental protocol for both groups.



	Insulin ($mUL.ml^{-1}$)		Cortisol ($ng.ml^{-1}$)		Growth hormone ($ng.ml^{-1}$)		
	Before TWHITP	After TWHITP	Before TWHITP	After TWHITP	Before TWHITP	After TWHITP	
G1	Rest	9.8 ± 7.0	10.2 ± 6.2	114.5 ± 27.3	119.9 ± 29.0	2.4 ± 2.6	2.8 ± 2.0
	End	15.3 ± 8.3	18.1 ± 8.1	138.5 ± 36.2	150.4 ± 33.9	17.1 ± 13.5	14.9 ± 13.1
	5 min	22.4 ± 9.6	22.9 ± 9.2	146.5 ± 31.0	158.7 ± 30.8 *	18.5 ± 13.8	16.7 ± 12.5
	10 min	18.3 ± 7.6	18.1 ± 7.4	173.0 ± 43.3	165.7 ± 30.9	19.4 ± 13.8	19.8 ± 14.0
	20 min	16.9 ± 3.5	17.1 ± 5.5	166.5 ± 54.2	155.3 ± 38.2	17.3 ± 12.9	17.6 ± 12.2
	30 min	13.1 ± 5.6	12.9 ± 5.4	148.5 ± 58.8	132.5 ± 43.9	13.1 ± 10.4	12.5 ± 10.9
G2	Rest	10.7 ± 6.3	14.8 ± 13.3	134.0 ± 58.5	119.5 ± 79.4 *	0.5 ± 0.5	0.7 ± 0.6
	End	21.4 ± 14.7	19.8 ± 16.3	171.0 ± 50.6	144.1 ± 83.4	18.6 ± 13.5	14.5 ± 14
	5 min	34.0 ± 18.7	25.1 ± 19.0	176.0 ± 62.6	153.1 ± 95.9	18.6 ± 11.4	14.1 ± 12.3
	10 min	23.0 ± 11.9	18.1 ± 13.6	220.5 ± 63.1	175.7 ± 103.1	19.2 ± 10.0	14.6 ± 11.4
	20 min	17.9 ± 7.6	15.8 ± 10.9	230.5 ± 68.0	181.9 ± 107.1	17.9 ± 8.7	14.0 ± 10.4
	30 min	14.9 ± 6.8	12.9 ± 8.5	204.5 ± 56.0	161.6 ± 96.7	15.1 ± 7.7	12.5 ± 9.6

Tableau n ° 1: Mean values (\pm SD) of plasma concentration of insulin, cortisol and growth hormone before and after TWHITP in G1 and G2,

Findings – our results showed that MAS was in G1 compared to G2 ($p < 0.001$) between Pre and Post – test. However no significant increase was observed on VO_{2MAX} in G1 and G2 AT POST –TEST compared to pre –test. For G1 our results showed a significant increase ($P < 0.01$) ON TLIM100 performance and d_{lim100} performances in response to TWHITP. Our results showed that before during and after the TWHITP 10000m and 5000m performances were significantly improved ($0.001 < p < 0.05$) on G1 compared to G2.

Conclusion – Performances were significantly improved in G1 only with using 10 repetitions per HITS calibrated reference to t_{lim100} .

Practical implications – Results showed that the TWHITP induced a significant improvement on MAS in both groups between the Pre and Post –test without any increasing in VO_{2MAX} these results can be returned to the insufficient volumes HIT over the TWHITP to reach the trainable limit for VO_{2MAX} .