

# IS THE TWO SPEED TEST AN USEFUL TOOL TO EVALUATE THE ANAEROBIC CAPACITY OF AN 800<sub>M</sub> RUNNER?

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## Abstract

Glycolysis is considered to be a determinant energy source for an 800m runner. The two speed test is a commonly used field test in the evaluation of the anaerobic metabolism in middle distance running. In fact, the maximal blood lactate concentration (MBLC) achieved in this test is considered to be an important indicator of the athlete's anaerobic capacity. The purpose of this research was to determine the relation between MBLC reached in the two speed test using a specific distance and the MBLC attained in an 800m competition. Ten male junior middle-distance runners performed a field test using as distances 2x300m and running intensities of 80-85% and >95% of maximal speed, respectively. The time of recovery between repeats was 25 min. Following each step blood samples were taken from the ear lobe in the 1st, 3rd, 5th, 7th, 10th and 12th minute of recovery. MBLC was also determined (within the same week) after a competition of 800m, using similar procedures. Only the MBLC reached in the maximal 300m of the two speed test (2nd step) was considered for data analysis. The blood lactate concentration was obtained using a YSI-1500L Sport. Linear regression model was used. The average value concerning the 800m performance was 2'02"77 (1'54"31-2'08"52). The mean value for the MBLC achieved in the two speed test was  $14.49 \pm 1.61$  mmol/l, corresponding to a maximal speed of  $7.65 \pm 0.36$  m/s. The mean value for the MBLC achieved in the 800m competition was  $15.21 \pm 1.59$  mmol/l, corresponding to a maximal speed of  $6.54 \pm 0.26$  m/s. Regression results ( $Y=2.5+0.9x$ ) were highly significant ( $F=29.3$ ,  $p=0.005$ ), with a  $r^2=80\%$  and a standard error of estimate= $0.8$ mmol/l. In conclusion, the MBLC determined in the two speed test using 2x300m as running distance, seems to provide a reasonable approach concerning the MBLC achieved in an 800m competition and therefore might be used as an important tool to evaluate the athlete's anaerobic capacity in training condition.





## INTRODUCTION

Running performance in the 800m is determined both by aerobic and anaerobic energy supplying systems existing in the muscles. Aerobic capacity is important to create a good background which will enable running at a high speed with low lactate levels. But, in order to achieve high performances in this distance is also important to use the fast twitch fibers to produce maximum velocity levels and this is only possible with the contribution of anaerobic metabolism (Komi et al., 1977). Some studies (Fujitsuka et al., 1982), suggest that peak blood lactate concentration may be used as a valid indicator of anaerobic capacity and this can be useful in the evaluation of the 800m running performance.

The two speed test is a commonly used field test in the evaluation of the anaerobic metabolism in middle distance running (Mader et al., 1980, Krüger, 1995) The maximal blood lactate concentration (MBLC) achieved in this test can be considered to be an important indicator of the athlete's anaerobic capacity. The MBLC is greater at the higher running velocity (Tossavainen et al., 1996).

Thus the purpose of this study was to determine the relation between MBLC reached in the two speed test using a specific distance and the MBLC attained in an 800m competition.

## METHODS

The runners' average age, height and weight was,  $18.6 \pm 0.5$  years  $171 \pm 4.2$ cm and  $62 \pm 3.58$ kg, respectively.

We investigated 10 male Portuguese junior middle-distance runners. They performed a field test in a 400m synthetic track using as distances  $2 \times 300$ m and running intensities of 80-85% and  $>95\%$  of maximal speed, respectively. The time of recovery between repeats was 25min. Following each step, blood samples were taken from the ear lobe in the 1st, 3rd, 5th, 7th, 10th and 12th minutes of recovery. Only the MBLC reached in the maximal 300m of the two speed test (2nd step) was considered for data analysis.

MBLC after a competition of 800m was also determined (within the same week), using the same procedures. All blood lactate analysis were conducted using a Yellow Springs Instruments-1500L Sport.

Linear regression model was used to study the relation between the MBLC achieved after the two speed test and after the 800m competition.

## RESULTS

The average value concerning the 800m performance was  $2'02''77$  ( $1'54''31$ - $2'08''52$ ). The mean value for the MBLC achieved in the two speed test was  $14.49 \pm 1.61$  mmol/l, corresponding to a maximal speed of  $7.65 \pm 0.36$  m/s.

Athletes	MBLC - 2ST	MBLC - C800
A	15.61	15.05
B	13.84	15.56
C	15.29	15.13
D	12.08	13.24
E	14.24	15.67
F	13.52	14.25
G	18.03	18.91
H	13.56	16.24
I	13.21	13.56
J	14.50	14.72
Means $\pm$ SD	14.49 $\pm$ 1.61	15.21 $\pm$ 1.59

Figure 1. Maximal blood lactate concentration achieved in the two speed test (MBLC-2ST) and 800m competition (MBLC-C800).

The mean value for the MBLC achieved in the 800m competition was  $15.21 \pm 1.59$  mmol/l, corresponding to a maximal speed of  $6.54 \pm 0.26$  m/s (Figure 1).

Regression results ( $Y=2.5+0.9x$ ) were highly significant ( $F=29.3$ ,  $p=0.005$ ), with a  $r^2=80\%$  and a standard error estimated in  $0.8$ mmol/l.

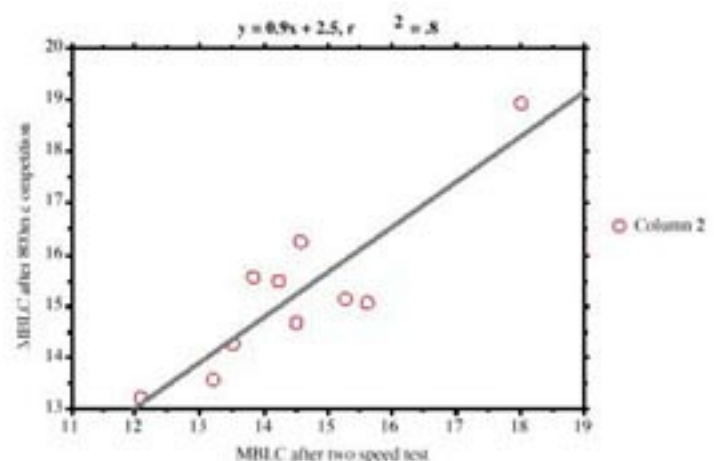


Figure 2. Relationship between maximal blood lactate concentration (MBLC) achieved in the two speed test and 800m competition.



## CONCLUSION

In conclusion, the MBLC determined in the two speed test using 2x300m as running distance, seems to provide a reasonable approach concerning the MBLC achieved in an 800m competition and therefore might be used as an important tool to evaluate the athlete's anaerobic capacity in training condition.

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