

# Prediction of performance in an 800m competition based on the two-speed test

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## Abstract

The performance in young middle-distance runners is dependent, among other factors, on their aerobic and anaerobic capacity levels. Assessment of these capacities is an important contribution to a better understanding concerning performance differences and an important tool which can be used in training control. In this study, we've used the two-speed test (2ST) (Mader et al., 1980) to determine the anaerobic capacity in a group of young runners and related these data with the results obtained during an 800m competition.

The sample consisted of 12 male junior athletes ( $18.6 \pm 0.5$  years), all qualified for the Portuguese junior championships. The 2ST (2x300m) was performed within a maximum period of 7 days relative to an 800m competition, using intensities of 80-85% and >95% of maximal speed, respectively. Recovery time between each step was 25 min. Maximal lactate was determined after each step and also after competition (C800) using a YSI-1500L Sport. The running speed at 4 mmol/l was determined from test results. Correlation and linear regression was used.

The maximum lactate obtained was  $14.52 \pm 1.46$  mmol/l after the 2ST (LM2ST) and  $15.09 \pm 1.48$  mmol/l after C800 (LMC800). The mean running speed at the 800m competition (VC800) was  $6.76 \pm 0.20$  m/s. The V4 obtained in the 2ST (V42ST) was  $6.36 \pm 0.36$  m/s. The correlation between VC800 and LM2ST, was low ( $r=0.30$ ;  $p<0.05$ ). Linear regression analysis showed a  $\beta=0.91$  ( $p=0.0001$ ) between VC800 and V42ST ( $r^2=83\%$ ).

Main conclusions: (1) the best athletes are not necessarily those with higher lactate accumulation after maximum efforts; (2) however, the high correlation between V42ST and VC800 allows us to suggest that the former might be used as a predictor in 800m competitions.



## Introduction

The Portuguese middle and long distance runners have achieved a worldwide projection, sustained by high international results in major events. However, these results are not in accordance with a longitudinal and physiological evaluation of the training process, especially in the presence of young athletes of great potential. There have been developed several studies (Santos, 1994, 1995) done with some of the best Portuguese runners. However, little is known about how these athletes achieved high performance levels and how many could have reached the same results if their training had been properly individualised as young athletes.

The 800m training requires the combination of different capacities at a high level, especially in what the aerobic and anaerobic levels are concerned. Several studies (Haezlewod, 1984, Gamboa et al., 1996, Faccioni 1991) showed that the anaerobic metabolism has a predominant influence on the 800m competition.

In the attempt to deal with this issue in these runners, we need to evaluate the anaerobic capacity as well as the aerobic one. The two-speed test is commonly used on the assessment of the anaerobic metabolism in middle distance runners (Mader et al., 1980, Kruger 1995).

With this study we try establishing a relation between some anaerobic indicators obtained by the two-speed test with the performance in young 800m runners. Thus the purposes of this study were to determine the relation between LMC800 with the performance in C800 and also between V42ST with VC800.

## Methods

The runners' average age, height and weight were  $18.6 \pm 0.5$  years  $172 \pm 0.5$ cm and  $61 \pm 3.07$ kg, respectively. We investigated 12 male Portuguese junior middle distance runners. They performed a field test in an 400m synthetic track using distances of 2x300m and running intensities of 80-85% and >95% of maximal speed, respectively. The time of recovery between repetitions was 25m. Following each step, blood samples were taken from the ear lobe in the 1<sup>st</sup>, 3<sup>rd</sup>, 5<sup>th</sup>, 7<sup>th</sup>, 10<sup>th</sup> and 12<sup>th</sup> minutes of recovery.

Maximal blood lactate concentration 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 determine the V4 through the two-speed test. To study the relation between the VC800 and LM2ST and also between VC800 and V42ST, we used the Pearson's correlation model.



## Results

The maximum lactate obtained was  $14.52 \pm 1.46$  mmol/l after the 2ST (LM2ST) and  $15.09 \pm 1.48$  mmol/l after C800 (LMC800). The mean running speed at the 800m competition (VC800) was  $6.76 \pm 0.20$  m/s.

Athletes	V42ST	VC800
A	6.19	6.73
B	6.86	7.07
C	6.66	6.88
D	6.64	6.84
E	6.53	6.79
F	6.20	6.70
G	6.03	6.66
H	6.67	6.87
I	5.79	6.48
J	5.99	6.38
K	6.03	6.69
L	6.74	7.01
Mean $\pm$ SD	6.36 $\pm$ 0.36	6.76 $\pm$ 0.20

Figure 1 - Velocity (m/s) corresponding to the best performance at 800m (VC800) and V4 obtained through the two-speed test (V42ST).

The V4 obtained in the 2ST (V42ST) was  $6.36 \pm 0.36$  m/s. The correlation between VC800 e o LM2ST was low ( $r=0.30$ ;  $p<0.05$ ). Linear regression analysis showed a beta=0.91 ( $p=0.0001$ ) between VC800 and V42ST ( $r^2=83\%$ ).

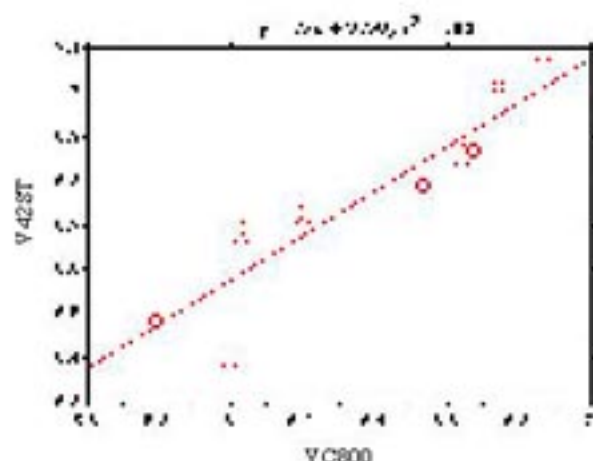


Figure 2 - Relationship between V4 determined through the two-speed test (V42ST) and the performance in an 800m competition (VC800).

## Conclusions

The main conclusions of this study were:

The best athletes are not necessarily those with higher lactate accumulation after maximum efforts;

However, the high correlation between V42ST and VC800 allows us to suggest that the former might be used as a predictor in 800m competitions.

## References

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