

Kyle Bennett, Andy Moss & Clare Pheasey

Department of Exercise & Sport Science, Manchester Metropolitan University

## INTRODUCTION

A high capacity to take in and utilise oxygen (maximal oxygen uptake or  $VO_{2max}$ ) and a high lactate threshold (LT) are considered to be the most important physiological determinants of success in both middle and long distance running performance (Brandon, 1995: *Sports Medicine*, 19(4), 268-277). Crash Training (CT) is a method of training conducted over a relatively short period of time (3-7 days) during which a 100% increase in training volume and high intensity sessions are prescribed. The increase in physiological stress experienced whilst CT provides a greater training stimulus than that experienced during 'normal' training. It is believed that CT specifically facilitates an increase in  $VO_{2max}$ .

## PURPOSE

The purpose of the study was to investigate the effect of a CT protocol on both  $VO_{2max}$  and LT.



## METHODS

- Following ethical approval, eight middle distance runners (mean  $\pm$  SD; age  $16.4 \pm 1.2$  yrs; stature  $171.2 \pm 7.0$  m; and body mass  $60.7 \pm 7.6$  kg) gave informed consent to participate in the study.
- Participants were divided into two groups, CT and Control (CONT).
- The CT group followed a CT protocol for a period of 5 days, followed by 5 days of reduced training (50% of the normal weekly training mileage) and 14 days of normal training before repeating the CT protocol for a second time.
- During this time participants in the CONT group continued to train normally.
- Participants completed treadmill tests pre- and post-intervention to ascertain LT and  $VO_{2max}$ . Whole blood was analysed to obtain lactate concentration, whilst heart rate (measured at 60s intervals); rate of perceived exertion (RPE); and expired air data were recorded in accordance with established protocols.

## DATA ANALYSIS

Following appropriate checks on underlying assumptions, a two way (mixed) analyses of variance (ANOVA) was used to determine significant differences between the dependant variables.

## KEY FINDINGS

- Mean  $VO_{2max}$  increased significantly in the CT group ( $P < 0.005$ ) compared to no change in the CONT group (Fig. 1).
- There was no change in mean LT observed in the CT group or in the CONT group (Table 1).
- It was also noted that time to fatigue during  $VO_{2max}$  test increased significantly (626 – 697s,  $P < 0.005$ ) in the CT group but not in the CONT group (598 – 608s).

Table 1: The percentage change in different physiological parameters

	Change (%)	
	CT	CONT
$VO_{2max}$	5.2	0.3
Lactate Threshold	0	4.4
Time to Fatigue	11.3	1.8

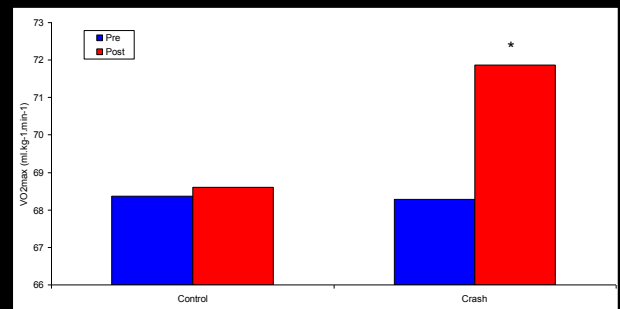


Fig 1: Pre- and post-  $VO_{2max}$  values for control and crash training, \* denotes significant difference from pre- values ( $P < 0.05$ ).

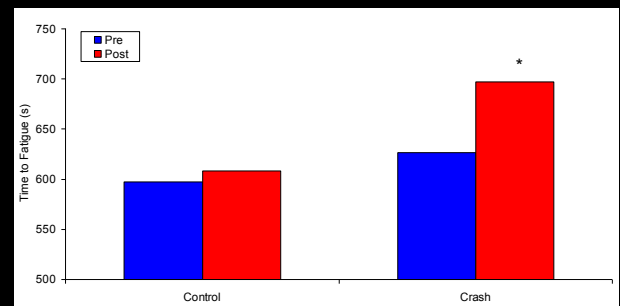


Fig 2: Time to fatigue values for control and crash training, \* denotes significant difference from pre- values ( $P < 0.05$ ).

## CONCLUSION

In conclusion, participating in a CT protocol can significantly increase  $VO_{2max}$  in middle distance runners. Future research could look at the CT protocol in more detail, investigating the effects of the number of CT cycles with a view to identifying an optimum, also any potential overtraining risks with repeated use of the CT protocol, also any benefits with athletes participating in more training at the LT to try and improve this.