

# Effect of New Zealand blackcurrant extract on substrate oxidation and cycling performance in normobaric hypoxia

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## ABSTRACT

Blackcurrant is high in anthocyanin content. We have shown enhanced whole-body fat oxidation and increased time trial performance during cycling, in addition to increased femoral artery diameter during a sustained submaximal isometric contraction of the *m.quadriceps* with intake of New Zealand blackcurrant (NZBC) extract in normobaric normoxia (Cook et al., 2015, 2017). The effect of blackcurrant on metabolic and physiological responses and performance during cycling in normobaric hypoxia are not known. **PURPOSE:** To examine the effect of NZBC extract on intensity-dependent physiological and metabolic responses and 16.1-km cycling time trial in trained cyclists in normobaric hypoxia. **METHODS:** The study used a double-blind randomized cross-over design. Eleven healthy men from cycling and triathlon clubs with at least 3 yrs experience and cycling 8-10 hr·wk<sup>-1</sup> (age: 38±11 yrs, height: 179±4 cm, body mass: 76±8 kg,  $\dot{V}O_{2max}$ : 47±5 mL·kg<sup>-1</sup>·min<sup>-1</sup>, maximum power: 398±38 W, mean±SD) ingested NZBC extract (600 mg·day<sup>-1</sup> containing 220 mg anthocyanins) or placebo (PL) for 7 days (washout 14 days). Participants performed bouts of 10 min at 45, 55 and 65%  $\dot{V}O_{2max}$  using indirect calorimetry and blood sampling, followed by a 16.1 km time-trial on a SRM ergometer (SRM International, Germany). Participants were familiarized for the time-trial. All testing took place in a temperature controlled (15°C) normobaric hypoxic chamber set at an altitude of ~2500 m (15% FIO<sub>2</sub>) (TIS Services, Medstead, UK) in morning sessions. Data was analysed using paired t-tests. **RESULTS:** At each intensity, NZBC extract had no effect on metabolic and physiological responses (e.g. at 65%  $\dot{V}O_{2max}$  heart rate - PL: 133±12, NZBC: 132±12 beats·min<sup>-1</sup>; fat oxidation - PL: 0.24±0.12, NZBC: 0.20±0.16 g·min<sup>-1</sup>; carbohydrate oxidation - PL: 2.34±0.42, NZBC: 2.48±0.35 g·min<sup>-1</sup>; lactate - PL: 1.37±0.45, NZBC: 1.56±0.57 mmol·L<sup>-1</sup>). No improvements in 16.1 km time-trial performance were observed (PL: 1685±92, NZBC: 1685±99 sec). **CONCLUSION:** Seven day intake of New Zealand blackcurrant extract does not change whole-body fat oxidation and 16.1 km time-trial performance during cycling in normobaric hypoxia.

## INTRODUCTION

Enhanced exercise-induced fat oxidation and faster 16.1 km cycling time trial performance was observed with intake of New Zealand blackcurrant extract at sea level (Cook et al., 2015). Effect of intake of New Zealand blackcurrant extract during exercise at altitude is not known.

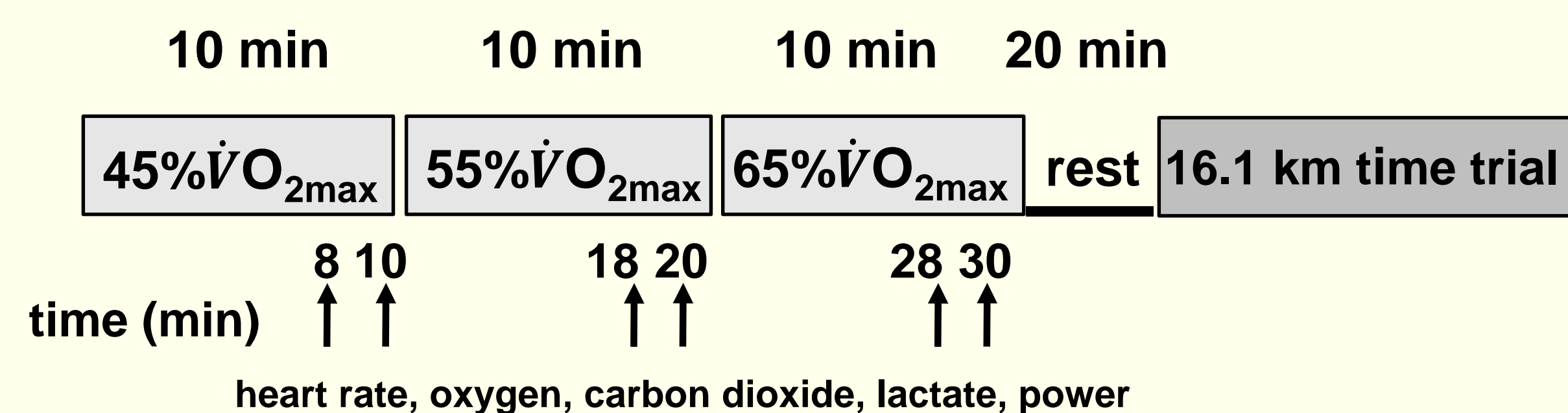
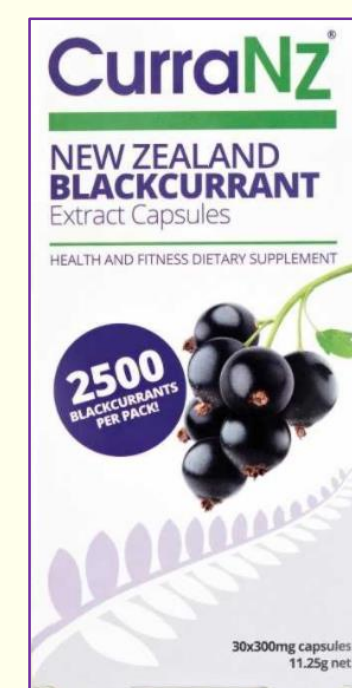
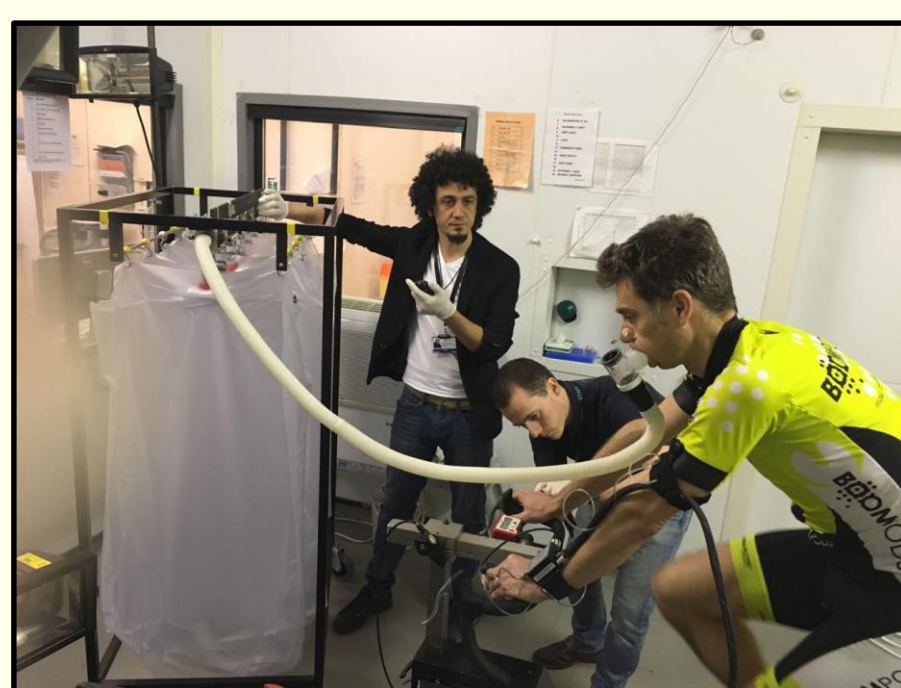
## AIM

To examine the effect of New Zealand blackcurrant extract on the metabolic and physiological responses and 16.1 km time trial performance during cycling in normobaric hypoxia.

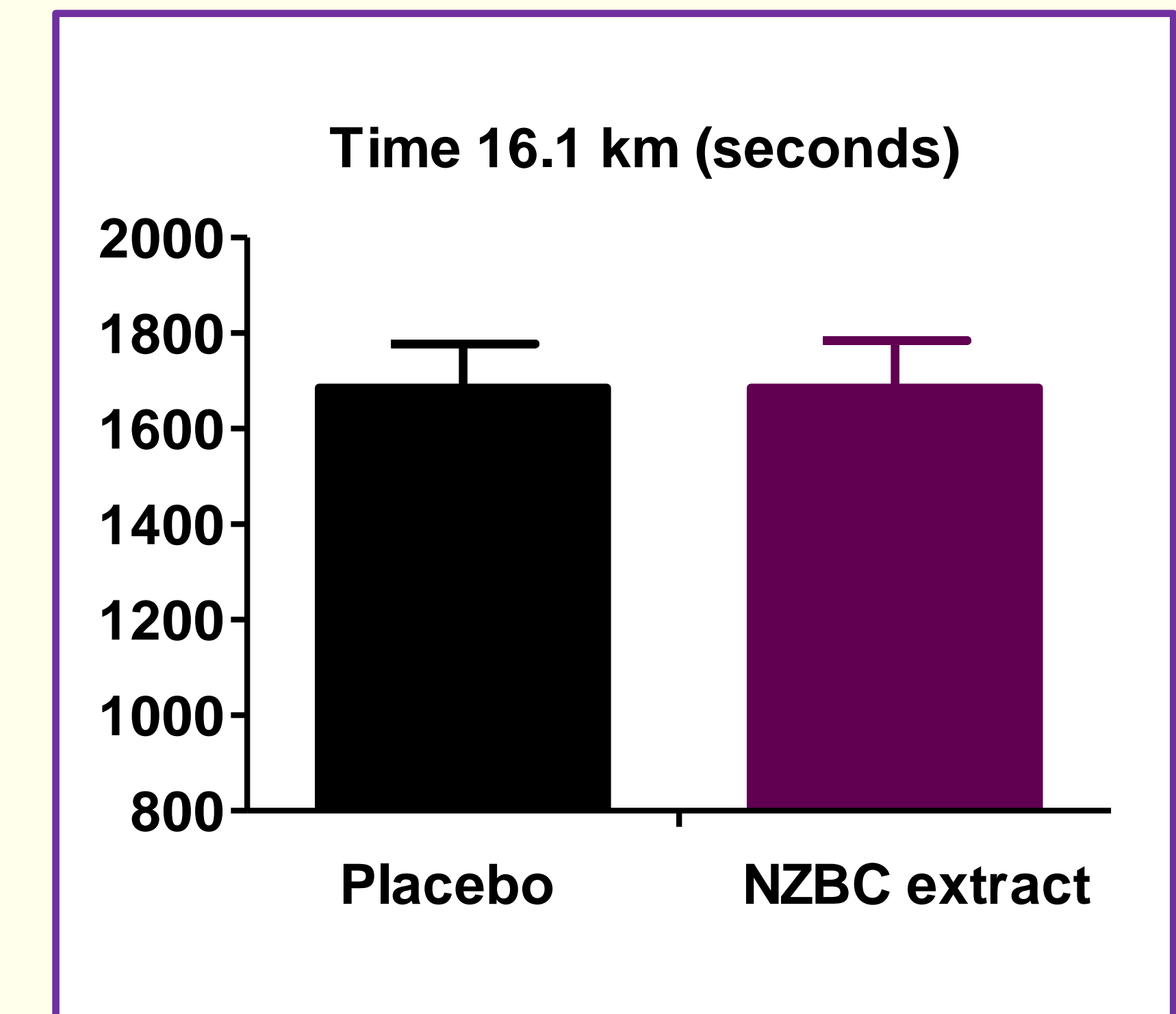
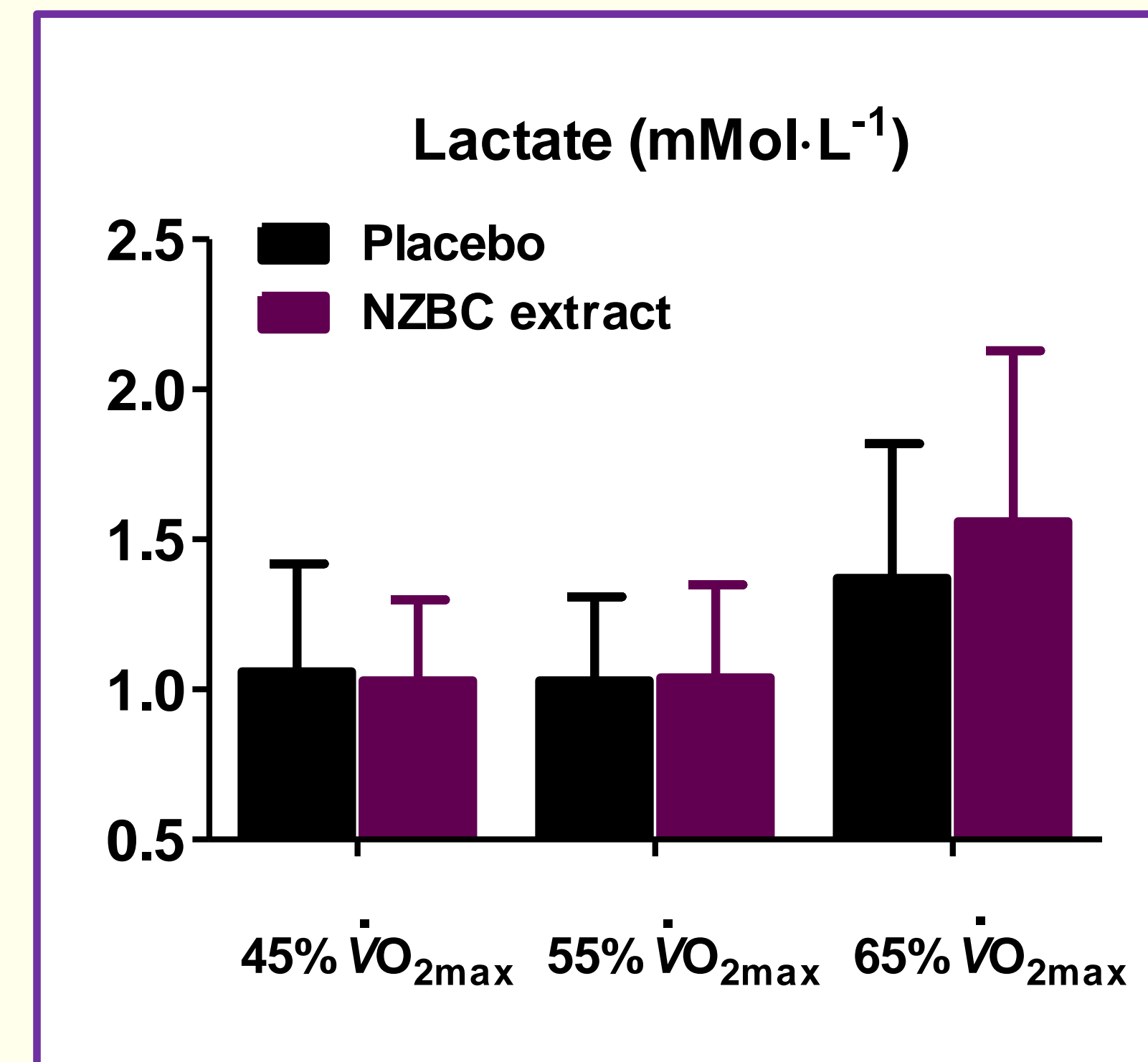
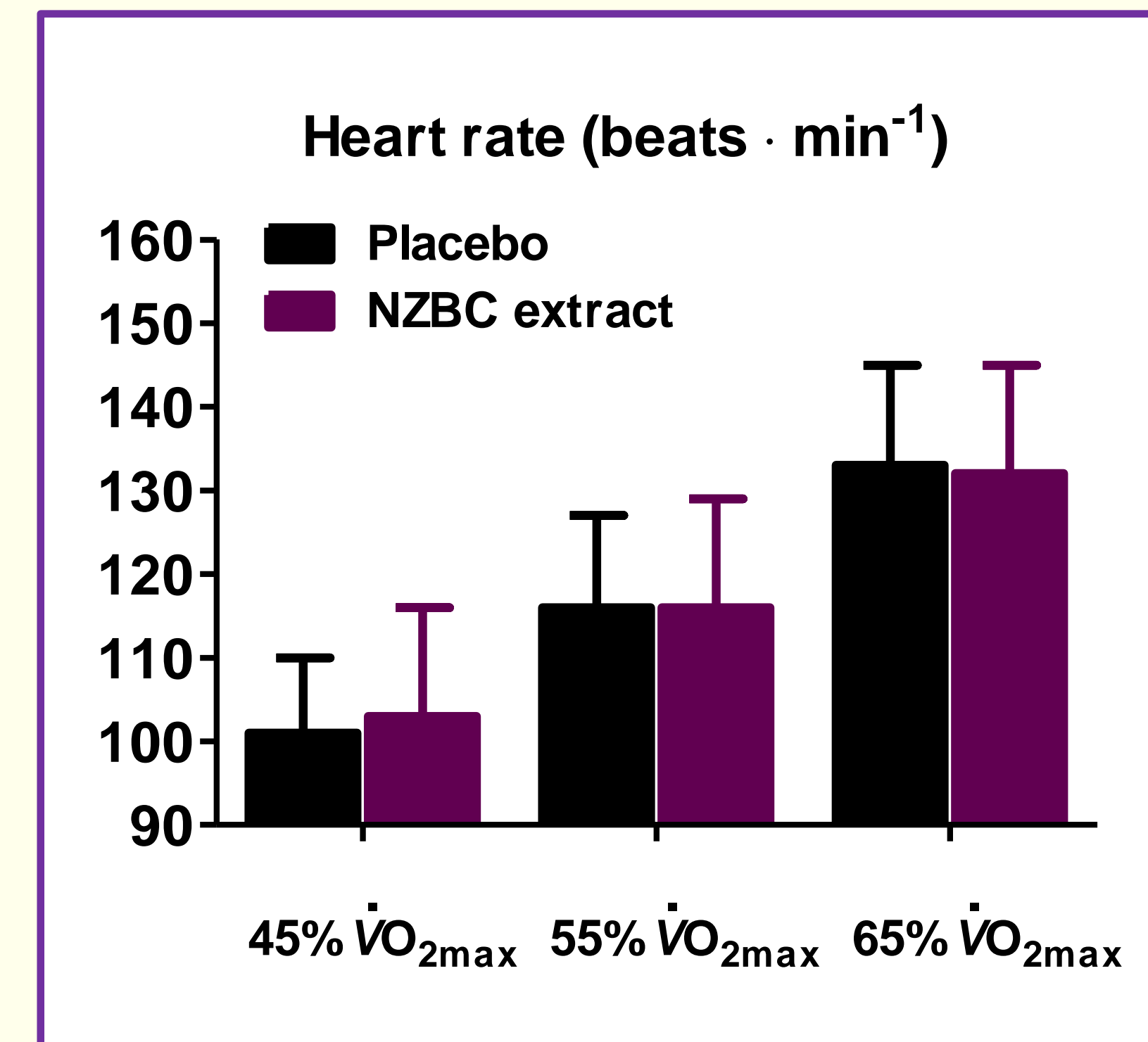
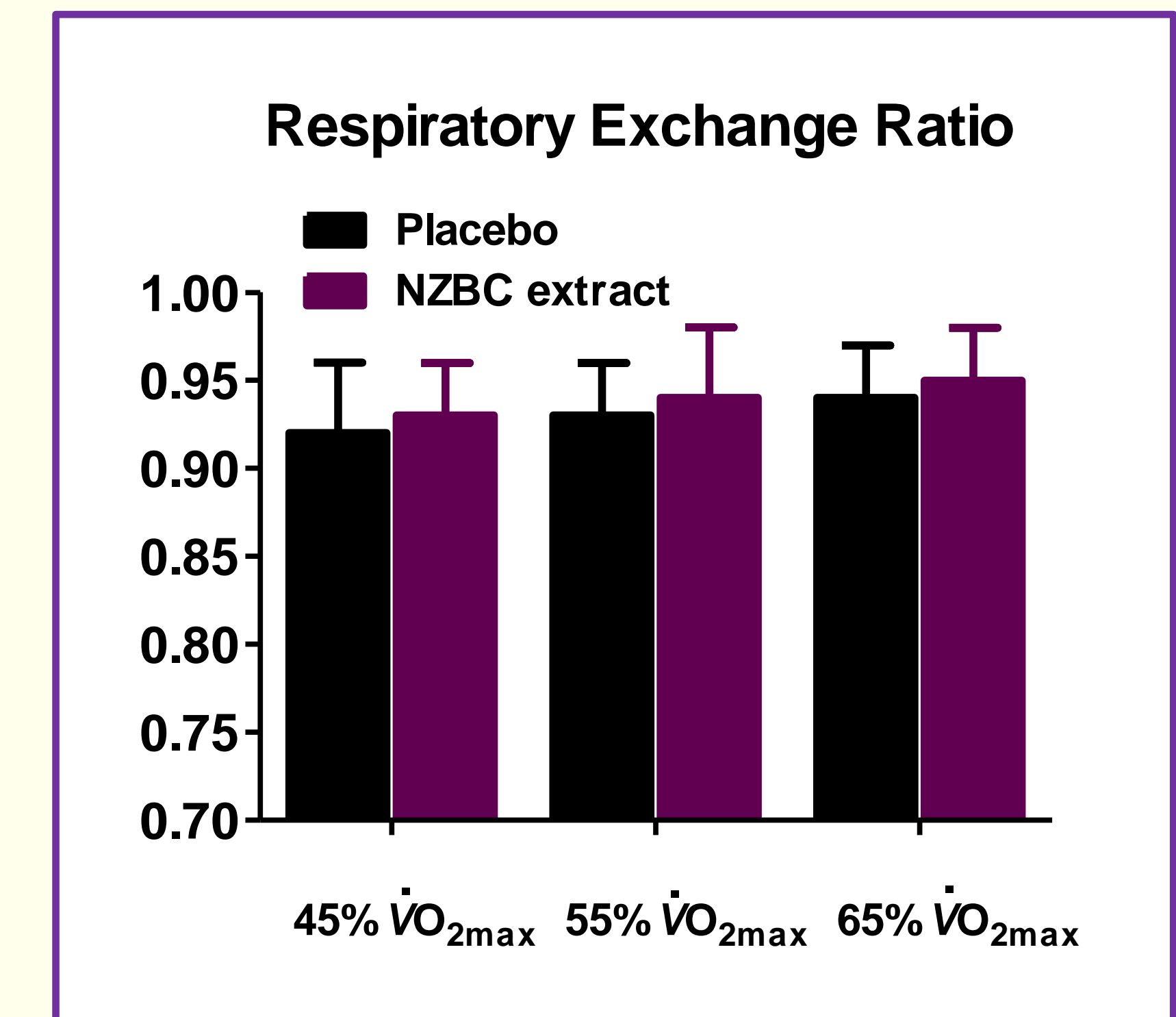
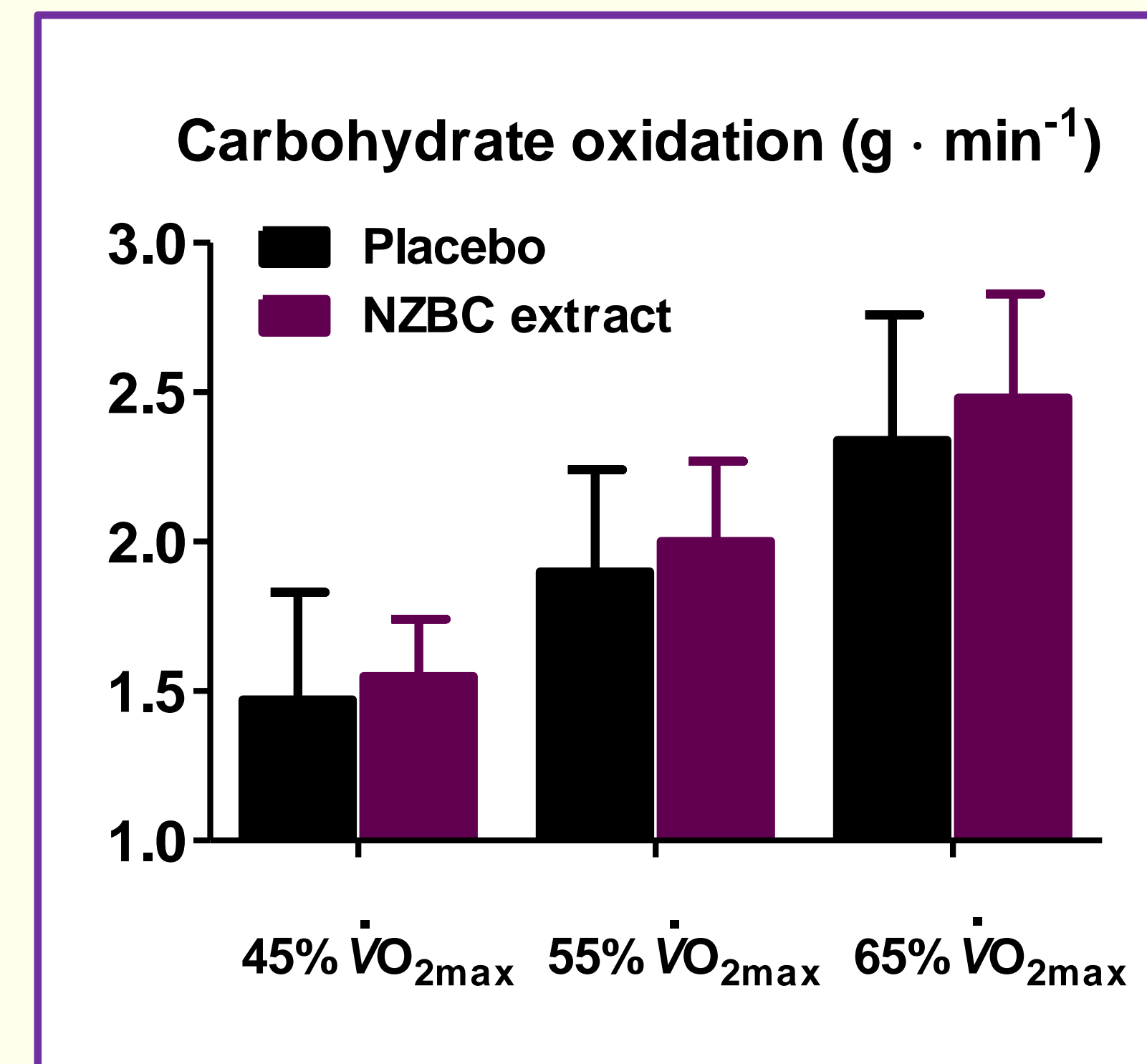
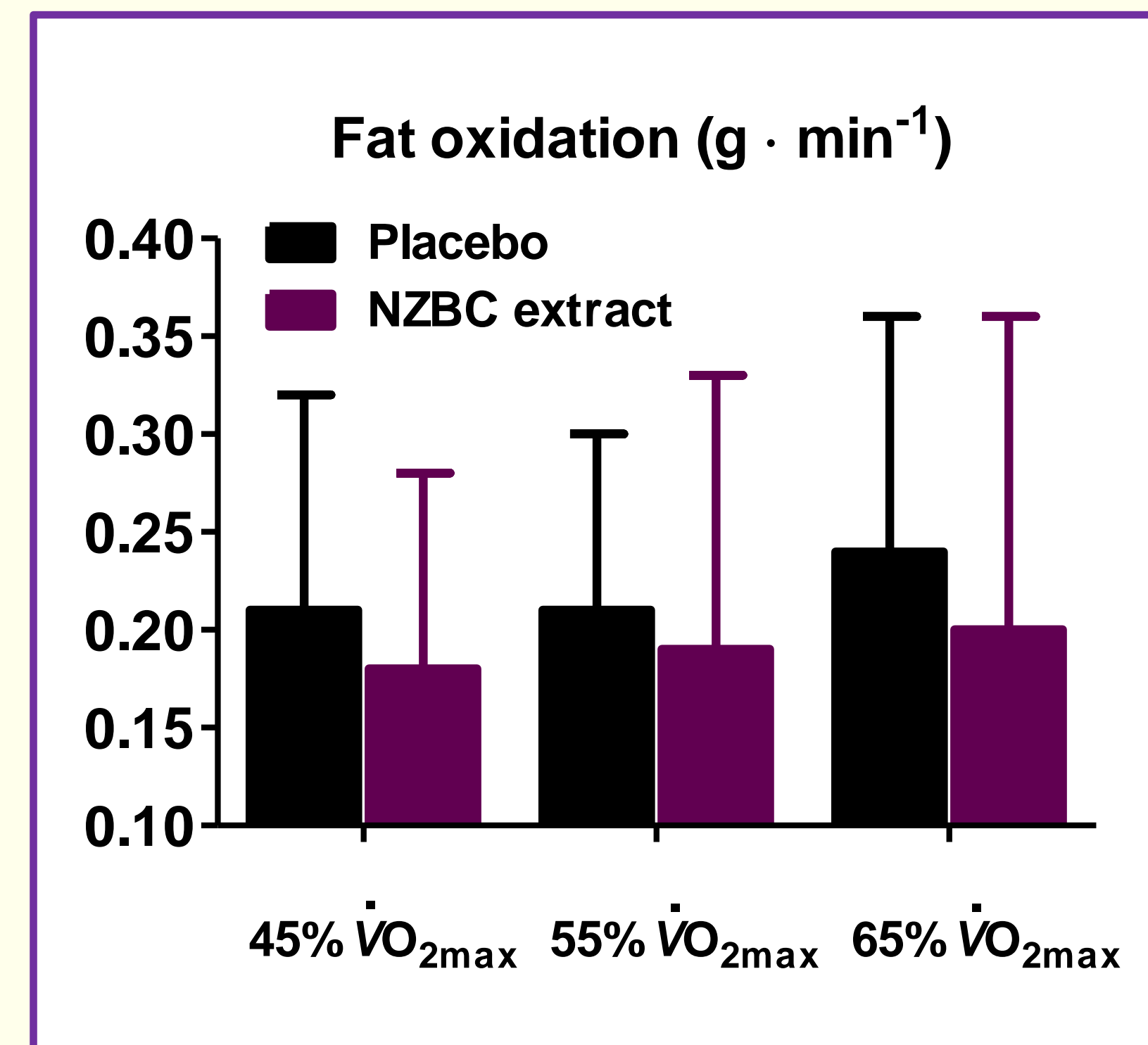
## METHODS

The study used a double-blind randomized cross-over design. Eleven healthy men from cycling and triathlon clubs with at least 3 yrs experience and cycling 8-10 hr·wk<sup>-1</sup> (age: 38±11 yrs, height: 179±4 cm, body mass: 76±8 kg,  $\dot{V}O_{2max}$ : 47±5 mL·kg<sup>-1</sup>·min<sup>-1</sup>, maximum power: 398±38 W, mean±SD) ingested NZBC extract (600 mg·day<sup>-1</sup> containing 220 mg anthocyanins) or placebo (PL) for 7 days (washout 14 days). Participants performed bouts of 10 min at 45% (~117 W), 55% (~161 W) and 65%  $\dot{V}O_{2max}$  (~205 W), using indirect calorimetry and blood sampling, followed by a 16.1 km time-trial on a SRM ergometer (SRM International, Germany).

Participants were familiarized for the time-trial. All testing took place in a temperature controlled (15°C) normobaric hypoxic chamber set at an altitude of ~2500 m (15% FIO<sub>2</sub>) (TIS Services, Medstead, UK) in morning sessions. Substrate oxidation was quantified with consideration of inspiratory fractions of oxygen and carbon dioxide. Data was analysed using paired t-tests with significance accepted at *P*<0.05.



## RESULTS



**New Zealand blackcurrant extract had no effect on physiological and metabolic responses during submaximal intensity cycling and 16.1 km time trial performance in normobaric hypoxia in male cyclists.**

## CONCLUSION

We observed enhanced exercise-induced fat oxidation and faster 16.1 km cycling time trial performance at sea level with intake of New Zealand blackcurrant extract (Cook et al., 2015). However, exercise responses and performance at an altitude of 2500 m in the present study are not affected by 7-day intake of New Zealand blackcurrant extract.

## REFERENCES

Cook MD, Myers SD, Blacker SD, Willems MET. New Zealand blackcurrant extract improves cycling performance and fat oxidation in cyclists. *European Journal of Applied Physiology* 115(11): 2357-2365, 2015.

## ACKNOWLEDGEMENT

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