

ABSTRACT

The Marathon des Sables (six stages, ~250 km running) in the Sahara Desert requires physiological and metabolic adaptations by physical training and nutritional strategies. **PURPOSE:** Four weeks before competition in the Marathon des Sables 2023, we examined effects of 7-day intake of New Zealand blackcurrant (NZBC) extract (210 mg anthocyanins per day) on 1-hr treadmill running-induced physiological and metabolic responses in the heat (~34°C, relative humidity: ~30%) in an amateur female and male athlete (23, 38 yrs, BMI: 24.2, 28.4 kg·m⁻², body fat%: 29.2%, 18.8%, $\dot{V}O_{2max}$: 50.1, 52.1 mL·kg⁻¹·min⁻¹). **METHODS:** During the 1-hr run at 50% $\dot{V}O_{2max}$ (female: 7.3, male: 7.5 km·h⁻¹), indirect calorimetry was used and heart rate recorded at 15-min intervals with core temperature monitoring (0.05 Hz). The runs were 3-hr after breakfast (slice of bread and water) and 2-hr after intake of the final dose of NZBC extract with water *ad libitum*. **RESULTS:** With NZBC extract, there were no effects in the female athlete. The female athlete RER in the non-supplement condition was 0.77±0.01, indicating ~77% contribution of fat oxidation to energy requirements. In the male athlete during 1-hr of running (mean of 4 measurements), fat oxidation was higher by 21% (control: 0.84±0.11, NZBC: 1.02±0.08 g·min⁻¹, P<0.01), carbohydrate was 31% lower (control: 1.07±0.29, NZBC: 0.71±0.12 g·min⁻¹, P=0.05), RER was 0.03 units lower (control: 0.80±0.02, NZBC: 0.77±0.01, P=0.04), core temperature was 0.4°C lower (control: 37.7±0.3; NZBC: 37.3±0.3°C, P<0.01) with no differences for heart rate (control: 136±10, NZBC: 134±7 beats·min⁻¹, P=0.50), minute ventilation (control: 51.3±1.8, NZBC: 49.8±3.1 L·min⁻¹, P=0.43), oxygen uptake (control: 2.51±0.02, NZBC: 2.60±0.09 L·min⁻¹, P=0.10) and carbon dioxide production (control: 2.01±0.05; NZBC: 1.99±0.04 L·min⁻¹, P=0.72). **CONCLUSION:** Seven-day intake of New Zealand blackcurrant extract (210 mg anthocyanins per day) provided beneficial physiological and metabolic responses during 1-hr of indoor (~34°C) treadmill running in a male Marathon des Sables athlete 4 weeks before competition. Future work is required to address whether New Zealand blackcurrant provide a nutritional ergogenic effect for Marathon des Sables athletes during long-duration running in the heat with personalized nutrition.

INTRODUCTION

Willems and Briggs [1] provided first evidence that an ultra-endurance male runner responded to an anthocyanin-rich supplement with enhanced running-induced fat oxidation. The Marathon des Sables (six stages, ~250 km timed running race) is an ultra-endurance event in the hot Sahara Desert. No studies have examined the metabolic and physiological responses of anthocyanin-rich New Zealand blackcurrant extract during controlled exertional heat stress in athletes in the weeks preceding the Marathon des Sables ultra-endurance event.

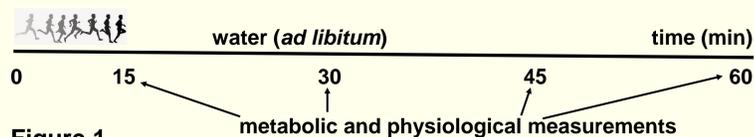
AIM

To examine the effects of 7-day intake of anthocyanin-rich New Zealand blackcurrant extract on the physiological and metabolic effects and core temperature in a female and a male amateur Marathon des Sables athlete during 1 h of treadmill running in hot conditions.

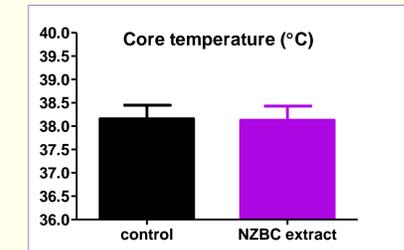
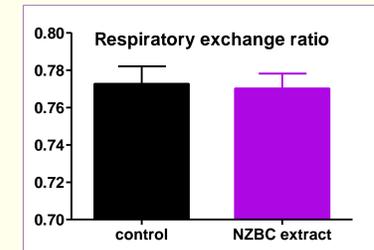
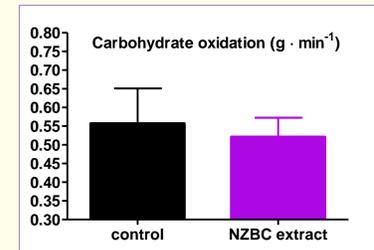
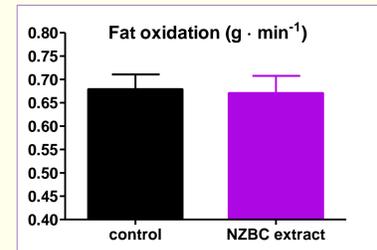
METHODS

A non-heat acclimatized female (age: 23 yr, BMI: 24.2 kg·m⁻², body fat%: 29.2%, $\dot{V}O_{2max}$: 50.1 mL·kg⁻¹·min⁻¹) and male (age: 38 yr, BMI: 28.4 kg·m⁻², body fat%: 18.8%, $\dot{V}O_{2max}$: 52.1 mL·kg⁻¹·min⁻¹) amateur ultra-endurance athlete were tested 3 to 4 weeks before participating in the Marathon des Sables 2023. Participants ran for 1 hr at a speed at 50% $\dot{V}O_{2max}$ (female and male: 7.3 and 7.5 km·h⁻¹) in ~34°C and 30% humidity without and with 7-day intake of 600 mg/day (i.e. 210 mg anthocyanins) of New Zealand blackcurrant extract (CurraNZ™, Health Currenacy Ltd., Surrey, UK). Core temperature (0.05 Hz) and physiological and metabolic parameters (every 15 minutes) were measured (Figure 1).

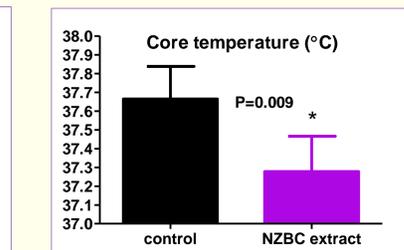
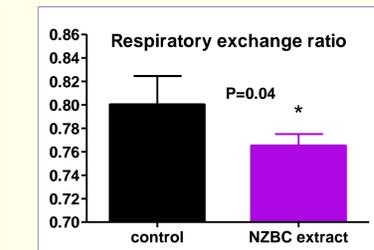
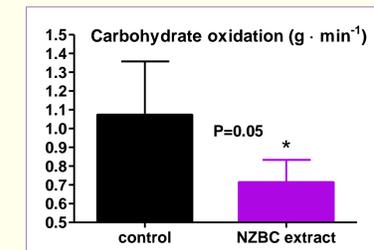
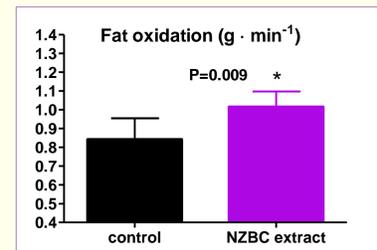
Substrate oxidation was calculated with proposed equations from Jeukendrup and Wallis [2]. Paired two-tailed t-tests were used for the 15 min metabolic and physiological responses and 15 min averages for core temperature during the 1 h treadmill run. Data are reported as mean±SD. Significance was accepted at $p \leq 0.05$.



RESULTS



New Zealand blackcurrant extract had no effect on physiological and metabolic responses during 1 hr of treadmill running in the heat in the female Marathon des Sables athlete



New Zealand blackcurrant extract enhanced fat oxidation by 21% and lowered carbohydrate oxidation by 31% and core temperature by 0.4 degrees during 1 hr of treadmill running in the heat in the male Marathon des Sables athlete

CONCLUSION

We observed enhanced running-induced fat oxidation and lower core temperature in the male Marathon des Sables athlete in hot conditions with 7-day intake of New Zealand blackcurrant extract. No effects were observed in the female athlete. The absence of a running-induced fat oxidation effect in the female athlete may have been due to a low respiratory exchange ratio obtained with the physical preparatory training for the Marathon Des Sables.

REFERENCES

- Willems, M. E., & Briggs, A. R. (2022). Running-induced metabolic and physiological responses using New Zealand blackcurrant extract in a male ultra-endurance runner: A case study. *Journal of Functional Morphology and Kinesiology*, 7(4), 104.
- Jeukendrup, A. E., & Wallis, G. A. (2005). Measurement of substrate oxidation during exercise by means of gas exchange measurements. *International Journal of Sports Medicine*, 26(Suppl 1), S28-S37.

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