Blackcurrant intake: making headway as an ergogenic aid!

Prof Mark Willems describes why nutritional interventions were undertaken with New Zealand blackcurrant. He expects that the findings on the effectiveness of New Zealand blackcurrant at rest and during exercise will contribute to the growing interest in applications of functional foods in sport and exercise science.

Introduction - value in anecdotal information

In 2011, the Netherlands National Triathlon Elite Team disclosed the intake of New Zealand blackcurrant powder as a nutritional ergogenic aid as part of their training programme, reporting that it seemed to contribute to the ability of elite athletes of nutritional ergogenic support is unique. The disclosure in 2011 did seem to be ignored by academics with an interest in sports nutrition, as evidence-based studies to support the ergogenic effects of New Zealand blackcurrant as an ergogenic aid were limited.

What evidence was out there and why the interest in New Zealand blackcurrant?

Blackcurrant is considered a superfruit with a high anthocyanin content compared to other berries. Anthocyanins are the pigments responsible for the variety of colours of berries. Berries differ substantially in anthocyanin composition with blackcurrant containing four main anthocyanins: cyanidin-3-O-glucoside, cyanidin-3-O-rutinoside, delphinidin-3-O-glucoside and delphinidin-3-O-rutinoside, those four making up ~87% of all phenolic compounds, according to et al. (2014). The anthocyanins contribute to the anti-oxidant and anti-inflammatory properties of berries. Regular berry intake is known to provide significant health benefits. In addition, berry intake reduces oxidative stress with beneficial effects during exercise and recovery.

Blackcurrant is not commonly consumed as a fresh fruit and mainly grown to be processed for food additives or blackcurrant products. The first study on the acute effects of a powdered extract made from New Zealand blackcurrants was conducted by the New Zealand institute of Sport and Food Research. The study suggested potential health implications for individuals undertaking regular exercise (Lyall et al., 2009). Five males and five females (age range 37 to 63 years) performed a 30-min row of a 1500 m time-trial with 6x19 s of high-intensity running with 15 s of low-intensity running protocol to exhaustion. The protocol consisted of stages with 6x19 s of high-intensity running with 15 s of low-intensity running between the 19 s runs. The rest time between the stages was 1 minute and stages were repeated with increasing sprint speeds (Perkins et al., 2015). In the same study, we also showed that time trial performance for 16.1 km was improved by 2.4% (see Figure 2) and this was comparable to the increased performance time with an acute dose of beetroot juice (i.e. 2.7%) as observed by the work of Prof Jones and colleagues at the University of Exeter (Lansley et al., 2011).

In another laboratory-based study with 7 days intake of the New Zealand blackcurrant extract and 13 active males (age: 25±4 yrs, VO2max: 56±4 mL·kg⁻¹·min⁻¹) performed a treadmill running protocol to exhaustion. The protocol consisted of stages with 6x19 s of high-intensity running with 15 s of low-intensity running between the 19 s runs. The rest time between the stages was 1 minute and stages were repeated with increasing sprint speeds (Perkins et al., 2015). The treadmill running protocol was an adapted intermittent treadmill running test to examine running ability in soccer players. We observed that New Zealand blackcurrant intake increased the total running distance by 10.6% from 3.871±682 m to 4.282±833 m with the distance of the high-intensity runs to be increased by 10.8%. At exhaustion, lactate values tended to be higher (NZBC: 6.01±1.07 mmol·L⁻¹, placebo: 5.89±1.07 mmol·L⁻¹), which may suggest an increased tolerance for high lactate values. In addition, in a field-based study with a sport-specific test in males, the New Zealand blackcurrant extract reduced slowing of the maximal sprint during the Loughborough Intermittent Shuttle Test (Willems et al., 2016). During the 5th 15-min block in the Loughborough Intermittent Shuttle Test, slowing was 0.06 sec with New Zealand blackcurrant extract and 0.12 sec in the placebo. In a study by et al. (2015), we also showed that New Zealand blackcurrant intake on the metabolic responses during exercise and enhanced performance for endurance cycling and repeated high-intensity running as well as suggest the ability to reduce slowing of maximal sprints indicate implications for exercise over a broad range of intensities and durations.

What next?

It will be challenging to design studies to examine the mechanisms for the effects of blackcurrant intake during exercise. Intake of an anthocyanin-containing supplement results in complex bioavailability of anthocyanins and metabolites. It is likely that the synergistic actions of the metabolites on cell function and fatigue mechanisms need to be understood. In addition, advanced understanding of the applied effects of anthocyanins and mechanisms on in vivo exercise and recovery would require manufactured cocktails of specific anthocyanin combinations and/or single anthocyanins to create such cocktails are problematic. Blackcurrant seems to contain a potent cocktail of anthocyanins with implications in sport and exercise sciences. More research is recommended to address, for example, the effects of blackcurrant intake on exercise in extreme environmental conditions, dose-response effects to establish dosing strategies, and the implications of blackcurrant intake for individuals with clinical conditions, e.g. peripheral arterial disease.

The future of berries in sport and exercise sciences

Research on the application of anthocyanin-containing products in sport and exercise sciences is in an early stage. Future studies will likely address the effects of anthocyanins in a competition of berries in sport and exercise sciences, and if so, which are the best? New Zealand blackcurrant has shown to be effective during exercise and recovery as a potent ergogenic aid with implications in sport and exercise sciences. The future of berries in sport and exercise sciences will likely address the effectiveness of other berries: Will we see a potent cocktail of anthocyanins with implications in sport and exercise sciences? Will we see a potent ergogenic aid with implications for active individuals enhancing the benefits of exercise performed for health, exercise training and competitive performance. The future for berry intake by athletes seems to be bright. The scene has been set by New Zealand blackcurrant.

References