PhD Opportunity

An exploration of responders and non-responders to New Zealand blackcurrant intake on metabolic and cardiovascular responses

Closing date:

Interview date:

## Supervisory team: Dr Matthew Cook

***Director of Studies****: Dr Matthew Cook*

***Supervisors****: Prof Derek Peters*

## Research Group: Human Performance Research Group

## The PhD Opportunity:

Use of dietary supplements as ergogenic aids is common among athletes to support training and enhance performance (Maughan et al 2011). Recent research has examined effects of non-traditional ergogenic aids such as blackcurrant due to both exercise and health effects. Blackcurrant contains a high and specific content of the polyphenol anthocyanins (Kähkönen et al 2003), considered to be the essential bioactive berry compounds.

Intake of New Zealand blackcurrant (NZBC) has been shown to alter resting cardiovascular function by increasing cardiac output (Willems et al 2015; Cook et al 2017) and improve cycling (Cook et al 2015) and repeated high intensity running performance (Perkins et al 2015). All these responses were observed in young healthy males and could have resulted from alterations in blood flow by blackcurrant. For example, Matsumoto et al (2005) observed oxygenated haemoglobin in the trapezius to be higher with 2-weeks intake of blackcurrant compared to a placebo during 30-minutes of typing. In addition, during a maximal voluntary contraction (MVC) of the trapezius performed 3-minutes following the typing, total haemoglobin was also higher. Furthermore, Cook et al (2017b) observed a 7-day intake of NZBC increased femoral artery diameter during a submaximal 120-second isometric contraction of the knee extensors, with a concomitant decrease in systolic, diastolic and mean atrial blood pressure. Further observations demonstrate that the increased femoral artery diameter during the isometric contraction following NZBC is dependent upon intake duration, with no change from 1-day, but an increase following 4 and 7-days (Cook et al. 2021).

All these studies have followed the traditional, randomised, double-blind, placebo-controlled design employed within sports nutrition research. However, this approach only compares participants following one intake of blackcurrant and placebo. This design does not investigate if those participants that demonstrate a positive effect (performance, cardiovascular, metabolic etc) respond consistently. For example, in the study by Cook et al (2015), 11 of 14 participants demonstrated a performance improvement while Perkins et al (2015) demonstrated performance improvements in 10 of 13 participants. For a supplement to be used and trusted within sports nutrition, athletes would regularly consume the supplement and need to know if the expected results can be achieved every time.

Additional effects following NZBC intake has included increased fat oxidation during exercise (Cook et al 2015; Cook et al 2017; Strauss et al 2018; Hiles et al 2020; Şahin et al. 2021; Şahin et al. 2022; Willems et al. 2022; Shan and Cook 2023). The underlying mechanisms for this observation are not known, and again the consistency of responders or non-responders has not been examined. The ability to determine factors that will lead to individuals who respond or do not respond is important for recommendations to athletes consuming NZBC.

This PhD will investigate the interindividual factors that could predict responders or non-responders to New Zealand Blackcurrant intake. It will involve laboratory data collection within a series of studies that are likely to be experimental designs that are randomised, double blind and placebo controlled. The individual variation in exercise performance and physiological responses will likely be examined through repeated testing sessions, to examine repeatability of responses. Ideally, participants will be experienced cyclists and runners and have a moderate to high level of training. They will be recruited from local cycling and running clubs and the community.

**References:**

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All successful applicants will be offered an interview with the proposed Supervisory Team. You will be contacted by a member of the Doctoral School Team to find a suitable date. Interviews can be conducted in person or over Microsoft Teams.

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**Research Group**

Human Performance

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**For further information or an informal discussion on this project, please contact Dr Matthew Cook (****matthew.cook@worc.ac.uk****)**

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