Cranberry- en druivenpitpolyfenolen

Door: Barry W. Ritz, PhD

Commentary

Results from a small, two-part placebo-controlled, randomized, crossover trial suggest that consumption of cranberry-rich polyphenols (as CranLoad™) modifies acute flow-mediated dilation (FMD), a biomarker of endothelial function and blood flow, in highly trained elite athletes. Polyphenol consumption was also associated with a decrease in blood lactate levels and heart rate post 3 km stationary bike time trial, but was not associated with improved anaerobic performance or perception of fatigue.

American cranberries (*Vaccinium marcrocarpon*) are a particularly rich source of polyphenols, especially the A-type proanthocyanidins. In addition to being potent antioxidants, these unique polyphenols have specific vasodilating and anti-adhesion effects that are associated with improved endothelial function. High-intensity sports are associated with altered blood flow and the accumulation of muscle and blood lactate. Therefore, there is great interest in sports nutrition products designed to facilitate and upregulate blood flow. CranLoad™, a proprietary blend of A-type and B-type proanthocyanidins from cranberry and grape seed, providing a total of 600-800 mg of polyphenols per serving, was developed in consultation with Olympic athletes in collaboration with Speed Skating Canada and the Own the Podium initiative towards the 2010 Olympic Games in Vancouver. The study objectives were to determine the effects of cranberry-rich polyphenols on blood flow in athletes and to determine whether enhanced blood flow would translate to improvements in performance and recovery.

In the first study included in the publication, the effects of CranLoad (600 mg polyphenols) were investigated in a pilot trial in 12 elite athletes, and demonstrated an increase in flow-mediated dilation (FMD). FMD is a measure of blood vessel dilation, which is related to blood flow to muscles, and is believed to influence lactate clearance and recovery. The study demonstrated a statistically significant increase in FMD as a percentage over baseline within 30 minutes of consuming the beverage. FMD remained elevated over baseline for 2 hours. Importantly, the product did not alter the normal insulin and glucose response to the carbohydrate content of the product. The peak increase in brachial artery diameter following consumption of 600mg of CranLoad polyphenols was 2.8% at 60 minutes. If determined as the incremental area under the curve (AUC) above baseline over time, this could be interpreted as a 3-fold increase, or 300% increase, over a 3-hour period. In short, CranLoad consumption yielded a statistically and clinically significant increase in brachial artery diameter, a surrogate measure of blood flow, in healthy, highly trained athletes at rest.

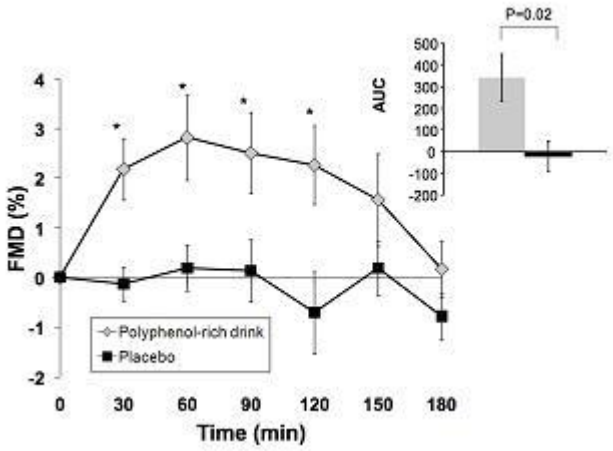

Figure 1: Flow-mediated dilatation (FMD) variation from baseline after intake of the polyphenol-rich drink (grey symbols) and placebo (black symbols) in the elite athletes. *: $p < 0.05$ versus baseline and placebo at specific time points. The insert presents the area under the curve (AUC) of the change in FMD over time above the baseline (time 0) values. The Y axis is in %*min.

In the second study, a double-blind, placebo-controlled, crossover trial, the effects of a 60 mL pre-exercise CranLoad shot (800 mg polyphenols) were investigated in 13 high-profile athletes. Briefly, the athletes performed an intense 3 km stationary cycling time trial after consuming either CranLoad or a placebo. There was no difference in performance or perception of fatigue. However, the results showed a significant 30% decrease in blood lactate following warm up in those athletes consuming CranLoad compared to placebo, with this reduction in plasma lactate maintained throughout exercise, as well as a small but significant reduction in heart rate. This study provides proof-of-concept that enhanced blood flow, as determined in the first study, is associated with enhanced lactate clearance during high-intensity exercise. This outcome suggests enhanced recovery, but not enhanced performance.

A third, unpublished pilot trial was conducted in men using a combination of CranLoad and green tea extract (*Camellia sinensis*), a natural source of caffeine, as a powder in a capsule. The trial confirmed the acute increase in vascular function over a three-hour period that was previously demonstrated, as shown above, but in non-elite athletes.

Collectively, these data demonstrate that CranLoad, a source of Type A proanthocyanidins from cranberry, induces positive short-term changes in vascular endothelial function. A similar physiological effect has been demonstrated with the amino acid arginine. CranLoad was not studied in comparison to arginine; however, it is interesting to view these preliminary data using cranberry polyphenols in the context of the arginine literature. According to a recent meta-analysis (Bai and Colleagues, Am J Clin Nutr 2009), supplemental arginine at doses ranging from 3-21 g/d increase flow-mediated dilation (FMD) on average 1.98% (95% CI, 0.47-3.48). Notably, most studies on the physiological effects of arginine have been conducted in diseased populations,

such as those with coronary artery disease (CAD). In comparison, although we are limited to only one trial, cranberry polyphenols increased FMD by 2.8% in *healthy* athletes. Thus, it can be hypothesized that CranLoad is at least as effective as arginine at increasing blood vessel diameter and supporting endothelial function, although this would require further study. Importantly, CranLoad has been studied in healthy young, well-trained adults, which would be expected to be less responsive to intervention than subjects with endothelial decline associated with CAD. It is of interest to determine whether cranberry polyphenols, as CranLoad, may enhance endothelial function in support of cardiovascular function. Finally, CranLoad has been demonstrated to not only increase blood vessel dilation, but also enhance blood lactate clearance, a relevant clinical effect. Although data are limited, these results are corroborated by other polyphenol studies suggesting a decrease in plasma lactate levels but no effect on anaerobic performance. Whether cranberry polyphenols may improve performance in conjunction with long-distance or more aerobic activity, as suggested by the authors, remains to be studied.

Interesting, CranLoad was developed in collaboration with Skate Canada, the Canadian Olympic speed skating team, as part of the Own the Podium initiative. Therefore, several Olympic level athletes trained with CranLoad over an extended period of time during the 2009-2010 season, and it was possible to assess attitudes towards the product from a blinded, voluntary survey of 11 athletes. The results have not been published, but can be summarized as generally positive. According to the survey, Olympic athletes who trained with CranLoad reported subjectively that they experienced enhanced recovery and would recommend CranLoad to other athletes.

These studies are part of Atrium’s ongoing research program investigating the health benefits of small fruit polyphenols. Additional studies are in progress looking at the effects of supplemental polyphenols on facets of the metabolic syndrome, such as blood glucose management, and cognitive health.

Citation

Labonte K et al: Acute effects of polyphenols from cranberries and grape seeds on endothelial function and performance in elite athletes; Sports 1(3):55-68, 2013.

Onderzoek (PDF; Sports 1(3):55-68, 2013, publicatie van MDPI AG)