Invited Commentary

Cardiovascular effects of chronic and acute whey protein ingestion

Vascular endothelial dysfunction has been associated with various CVD risk factors, including hypertension(1), and is considered an early event in the development of atherosclerosis. Elevated blood pressure (BP) represents a major independent risk factor for CVD(2) and is commonly treated pharmacologically by inhibiting angiotensin-converting enzyme (ACE). As ACE is a key enzyme in the regulation of BP, inhibition of its activity prevents the production of the vasoconstrictor angiotensin II from its precursor angiotensin I and removes ACE-mediated inactivation of the vasodilatory molecule bradykinin. Several clinical studies have shown improvement in vascular function in patients prescribed ACE inhibitors(3), potentially a result of the pleiotropic effects of ACE inhibitors on the vascular endothelium(4). Unfortunately, several adverse reactions associated with ACE inhibitors have been reported (i.e. hypotension, cough, fatigue), necessitating the need for alternative therapies.

Increasing interest in the prevention of CVD through the consumption of bioactive dietary compounds as an alternative to pharmacological therapy has led to the discovery of several food-derived peptides possessing ACE-inhibitory activity(5). Milk is one such example that serves as a rich source of bioactive peptides, including ACE-inhibitory peptides(6), which have been shown to exert a wide range of biological actions including decreased BP(7,8) and improved vascular function(9). Unfortunately, several adverse reactions associated with ACE inhibitors have been reported (i.e. hypotension, cough, fatigue), necessitating the need for alternative therapies.

In this issue of the *British Journal of Nutrition*, Pal & Ellis(25) provide insight into this uncertainty by assessing the acute impact of a whey protein isolate on BP, arterial stiffness and inflammatory markers in postmenopausal women, a population particularly susceptible to the development of CVD. Postprandial measurements were taken intermittently for 6 h following consumption of a breakfast meal in conjunction with one of three supplements: 45 g whey protein isolate, 45 g sodium caseinate or a 45 g glucose control. Despite significant time effects over the course of the 6 h postprandial period, there were no significant differences in BP, arterial...
stiffness or inflammatory markers between the three groups. The lack of acute effects on cardiovascular measures in this study suggests that the beneficial effects demonstrated previously with whey protein result from habitual intake. Only one other study has investigated the acute cardiovascular effects of a peptide derived from whey protein. This study non-invasively assessed vascular function before and serially for 2 h following ingestion of 5 g of a hydrolysed peptide derived from whey in young, healthy men and women. Compared with placebo (artificially sweetened water), ingestion of a beverage containing the whey-derived peptide significantly increased brachial artery flow-mediated dilation for up to 90 min postprandially. Furthermore, reactive hyperaemia forearm blood flow, a response primarily independent of NO formation, increased at 120 min postprandially. These findings suggest that acute ingestion of this whey-derived peptide enhanced vascular function via mechanisms both dependent and independent of NO production. Ongoing work from our laboratory is attempting to determine the effect of this particular whey extract on ageing-induced vascular dysfunction. In addition to its vascular effects, acute whey protein ingestion has the potential to suppress appetite and increase protein synthesis following exercise.

Nutraceuticals hold promise as an adjunct or alternative to pharmaceutical treatment of CVD. Emerging research indicates that whey proteins possess a wide range of biological effects that include improvement in CVD risk factors such as hypertension and vascular dysfunction. Future research is needed to further elucidate the potential health benefits and possible underlying mechanisms (i.e. NO production, ACE inhibition) to acute and chronic whey protein ingestion, particularly in individuals at an increased risk of CVD (i.e. hypertensives, aged, overweight), to identify the unique components of whey responsible and to determine the differing effects of intact and hydrolysed whey proteins. Continued investigation into the potential cardiovascular benefits of acute whey protein ingestion, particularly following a postprandial challenge or as a potential dietary therapy to attenuate early morning cardiovascular events, is warranted.

There is no conflict of interest.

Kevin D. Ballard

Human Performance Laboratory
Department of Kinesiology
University of Connecticut
2095 Hillside Road
Unit 1110
Storrs
CT 06269
USA
email kevin.ballard@uconn.edu

References


