Concurrent Session 5: Coronary Heart Disease

Bioactives to promote cardiovascular health: Comparative efficacy of grape seed extracts on different vascular preparations

MY Abeywardena, GS Patten, MJ Adams, JA Dallimore, PF Rogers
Preventative Health National Research Flagship, CSIRO-Human Nutrition, Adelaide, SA 5000

Background – Diet based strategies to promote cardiovascular health are becoming increasingly popular, and recent studies have identified potential therapeutic roles in human health for specific dietary components (bioactives). At present, the main heart health ingredients are those with strong scientific evidence for their efficacy (e.g., n-3 PUFAs; plant sterols). The market for foods to promote heart health is expected to grow 60% in the next 5 years, and therefore high demand exists for novel bioactives so long as they are backed by good scientific evidence.

Objective – 1) To develop a robust bioactive discovery process spanning from identification of target mechanisms, in vitro screening assays to pre-clinical substantiation in animal models prior to validation in humans; 2) To assess vascular relaxation actions of different plant and grape seed extract (GSE) and fractions on different blood vessel preparations representing conductance and resistance vessels of the normotensive WKY (Wistar-Kyoto) rat.

Design – Thoracic aorta, intact mesenteric vascular bed and the third arcade of mesenteric arteries (250-350 micron diameter) were isolated from 20 week old rats. Aortic rings (3 mm) were mounted under 4 g resting tension while the mesenteric bed was perfused continuously with oxygenated Krebs-Henseleit buffer. The micro-vessels were studied using a myograph. Test extracts were added cumulatively to vascular preparations pre-contracted with noradrenaline and the extent of relaxation recorded. GSE extracts were provided by Tarac Technologies (SA).

Outcomes – In the aortic ring preparation, different GSE extracts - polymeric fraction and Vinlife® - caused the greatest relaxation (80-90%) followed by the oligomeric fraction while the monomeric fraction was least effective as evident by a rightward shift in the dose-response curve. Similar profile was apparent for the perfused mesentery. Only the Vinlife® preparation resulted in a dose-dependent relaxation of the micro-vessels. Several other plant extracts caused relaxations in aortic rings ranging from 30-97% that were endothelium dependant. Lemongrass extract showed preferential relaxation in the mesenteric bed that may be mediated via cannabinoid (CB₁) receptors.

Conclusions – The observed differences in vascular relaxation among different GSE preparations may be due to compositional differences in the polyphenols.

The green tea catechin, epigallocatechin gallate, lowers serum cholesterol and the cholesterol synthesis precursor, lathosterol, but not their ratio in the cholesterol-fed rabbit

N Naumovski, B Blades, PD Roach
School of Environmental and Life Sciences, University of Newcastle, Ourimbah, NSW, Australia

Background – Epigallocatechin gallate (EGCG), considered to be the active component of green tea, has yet to be shown to lower cholesterol in the cholesterol-fed hypercholesterolaemic rabbit model. Furthermore, cholesterol reduction by EGCG may involve the reduction of cholesterol synthesis through inhibition of squalene epoxidase.

Objectives – To determine the effects of EGCG on serum cholesterol and on the cholesterol synthesis precursor, lathosterol, in the cholesterol-fed rabbit model of hypercholesterolaemia.

Design – Twelve NZ White rabbits were fed, for two weeks, a rabbit chow to which was added 0.25% (w/w) cholesterol. For the next four weeks, one group (6 controls) continued on the 0.25% (w/w) cholesterol chow while the other group (6 treated) was fed the 0.25% (w/w) cholesterol diet with 2% (w/w) EGCG added. Serum cholesterol (enzymatic assay) and lathosterol (GC) were measured and expressed as mean ± SEM.

Outcomes – The EGCG effectively lowered serum cholesterol by 85% (P = 0.02) from 8.6 ± 2.3 at week 2 to 1.3 ± 0.1 mmol/L at week 6. In contrast, serum cholesterol did not change significantly (P = 0.72) in the control group, going from 8.6 ± 2.3 at week 2 to 7.9 ± 4.0 mmol/L at week 6. Serum lathosterol decreased from 2.4 ± 0.5 at week 2 to 0.25 ± 0.05 µmol/L at week 6 (P < 0.01) in the treatment group and from 3.1 ± 1.1 at week 2 to 0.93 ± 0.32 µmol/L at week 6 (P < 0.01) in the control group and was significantly lower in the treatment group at week 6 compared to the control group (P = 0.03). However, when serum lathosterol was normalised using serum cholesterol (lathosterol/cholesterol) to account for lipoprotein carrier capacity, there were no differences between the groups.

Conclusions – The green tea catechin, EGCG, effectively lowered cholesterol and lathosterol in the cholesterol-fed hypercholesterolaemic rabbits but it did not have any effect on the serum lathosterol to cholesterol ratio.