Posters

Development and application of a liposome delivery method to enhance the bioavailability of antioxidants and evaluate cytotoxicity in colon and breast cancer in vitro models

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Background - Traditionally, when assessing highly insoluble compounds on in vitro cell culture models, chemicals such as tetrahydrofuran, dimethyl sulfoxide (DMSO) and ethanol have been applied as vehicles to enable delivery of experimental treatments. Liposomes have recently gained interest as potential delivery systems for hydrophobic and hydrophilic compounds as they mimic the transport of fat-soluble vitamins in vivo. Liposomes are vesicles consisting of a phospholipid bilayer surrounding an aqueous interior. Researchers investigating plant-derived micronutrients have previously used this concept to improve the bioavailability of both non-polar and polar antioxidants, avoiding solvent concentrations which would cause cytotoxicity.

Objectives - In this study, several antioxidants, known to be abundant and/or specific to mangoes, were assessed to determine their growth-inhibitory effects on breast cancer (MCF-7) and colon cancer (HT-29) cell lines. Additionally, the potential cytostatic and cytotoxic effects of β-carotene, quercetin and mangiferin were compared using the two in-vitro delivery methods.

Design - Antioxidant delivery was firstly achieved by dissolving test compounds in DMSO and adding to the culture medium at a concentration of 50µg/mL. Alternatively, using a method adapted from Stivala and colleagues (European Journal of Biochemistry. 2000; 267, 2290-2296), antioxidants were entrapped in liposomes (antioxidant/ phospholipid ratio of 0.1). Treatments commenced 24hr post-seeding and continued for 96hr. To ensure stable antioxidant concentrations throughout the study, the treatment media was changed after 48hr. Cell viability was measured using the MTS assay and a Student’s t-test was used to determine significant outcomes (P <0.05).

Outcomes - When mangiferin and quercetin were dissolved in DMSO vehicle, only quercetin was effective in altering cell number (P <0.01). However, when β-carotene, quercetin and mangiferin were incorporated into liposomes all significantly altered the proliferation of both colon and breast cancer in vitro cell models (P <0.01).

Conclusion - This research highlights the importance of appropriate delivery methods when assessing chemicals that are either insoluble in DMSO or are otherwise soluble but have impaired or limited biological uptake. Further, these findings demonstrate the effectiveness of bioactive chemicals commonly found in mango, in altering the proliferation of breast and colon cancer cell lines.

Characteristics of a high-glycaemic index diet in patients with existing cardiovascular disease

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Background - Recent evidence suggests that the inclusion of low glycaemic index (GI) foods in the diet may be protective against cardiovascular disease via either increased HDL-cholesterol concentrations1, reduced inflammatory response in the endothelium2, or both mechanisms.

Objective - To describe the nutritional characteristics of patients with existing cardiovascular disease who were consuming a low versus high GI diet.

Design - As part of baseline data collection for the LIPID trial, 1,077 participants also agreed to complete a semi-quantified FFQ investigating intakes of more than 170 foods. All foods which contributed significantly to dietary carbohydrate intake were allocated a GI value where available. Total dietary GI was calculated by determining an individuals average daily glycaemic load and dividing by the average total carbohydrate consumed in grams per day. Patients were classified into 4 groups according to their quartile of dietary GI, and the relationship between nutrition variables and GI was investigated by regressions of individual patient nutrition variables on GI quartile medians.

Outcomes - There were significant positive relationships between dietary GI and dietary energy, fat and carbohydrate intakes, and significant negative relationships between dietary GI and protein and alcohol intakes. Dietary GI was also significantly positively related to mono- and poly-unsaturated fat intakes, but not to saturated fat intake.

Conclusion - These data indicate that those patients with existing cardiovascular disease who tended to eat a diet that was higher in GI were also consuming more energy, less alcohol, more dietary carbohydrate and more dietary fat (including more mono- and poly-unsaturated fats), at the expense of dietary protein intake.

References