Laboratory Studies – Nutraceuticals

Chairpersons: D Chadee, TP Noël

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Effects of nutraceuticals on sprouting of cultured human umbilical vein endothelial cells and growth of sub-intestinal vessels in zebra fish embryos

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Objective: Nutraceuticals such as resveratrol, catechins, and curcumin have been reported to interfere, among others, with angiogenesis. Based on these reports, we evaluated a number of Surinamese nutraceuticals for their effects on angiogenesis in a cell culture and zebra fish model.
Design and Methods: Parts from *Cecropia peltata*, *Luffa acutangula*, *Momordica charantia*, *Morinda citrifolia*, *Oenocarpus bacaba*, *Psidium guajava* and *Spondias mombin* were extracted with distilled water, freeze-dried and evaluated for their cytotoxicity in cultured human umbilical vein endothelial cells (HUVEC) using a sulforhodamine B assay, as well as the sprouting of these cells in a scratch-wound assay. In parallel, the plant extracts were assessed for their effects on sub-intestinal vessel length in embryos of the zebra fish *Danio rerio*.
Results: At lowly cytotoxic concentrations (< IC_{50} values), the *C peltata*, *L acutangula*, *M charantia* and *M citrifolia* extracts yielded 20 to 100% larger wound gap areas when compared to those in untreated cell cultures, while the *O bacaba* extract produced a roughly 20% smaller wound gap area. Furthermore, the *L acutangula*, *M charantia* and *P guajava* extracts inhibited sub-intestinal vessel growth in zebra fish embryos by 30 to 50%, while the *O bacaba* preparation stimulated this phenomenon by about 50%.
Conclusions: The inhibitory effects of the *L acutangula*, *M charantia* and *P guajava* extracts, and the stimulatory effect of the *O bacaba* sample on HUVEC sprouting and zebra fish sub-intestinal vessel growth suggest that these nutraceuticals are able to interfere with angiogenesis.

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Evaluation of Surinamese medicinal plants for their effects on the contractility of hypoxic guinea pig myocardial tissue

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Objective: Cardiac stunning occurs after a transient hypoxic or ischaemic insult. Preparations from *Anona muricata* L, *Bixa orellana* L, *Cecropia palmata* Willd, *Erythrina fusca* Lour, *Hibiscus esculentus* L, *Psidium guajava* L and *Terminalia catappa* L were evaluated for their possible positive-inotropic effects in a laboratory model of cardiac stunning.
Design and Methods: Isolated guinea pig atria perfused in oxygenated Ringer-Locke buffer were exposed to five-minute periods of hypoxic stress and then allowed to recover for 2 × 3 minutes in oxygenated buffer alone or supplemented with norepinephrine (10^{-5} M) or a plant extract (0.001–1 mg/mL). Atrial contraction force (F) was measured with a force transducer and contractility was derived by calculation of dF/dt. Troponin C – a highly specific marker for heart muscle cell death – was measured in the perfusion solution in the absence or presence of the plant extracts.
Results: Reoxygenation led to a gradual recovery of the atria, but they remained in a state of depressed contractility for at least four minutes. However, exposure to the *A muricata*, *B orellana*, *C palmata* and *T catappa* extracts increased the contractility by 50 to 250%. Notably, troponin C release was three- to sixfold higher in incubations with the two latter preparations.
Conclusion: Preparations from *A muricata*, *B orellana*, *C palmata* and *T catappa* may possess positive-inotropic properties that may be useful in cardiac stunning. However, those from *C palmata* and *T catappa* may cause

myocardial damage that may limit their usefulness in this condition.

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***Moringa oleifera* seeds increase serum cholesterol concentration in rats**

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Objective: To investigate effects of *Moringa oleifera* (moringa) seeds on serum lipid concentrations in rats fed standard chow or high cholesterol diet.
Design and Methods: Twenty adult male Sprague-Dawley rats were divided into five equal groups and fed standard chow (control), standard chow + 1% moringa seed powder, 4% cholesterol diet alone, or 4% cholesterol diet + 0.5% or 1% moringa seed powder for 12 weeks. Moringa seeds and rat chow were crushed and mixed with cholesterol powder as required. Serum lipid concentrations were measured at weeks 0, 6 and 12, and fecal cholesterol concentration was measured at week 12. Liver and kidney functions were evaluated by biochemical assessment of relevant parameters including aspartate transaminase, alanine transaminase, creatinine and urea.
Results: Serum total cholesterol and low-density lipoprotein (LDL) concentrations were significantly elevated ($p < 0.01$) in rats fed the cholesterol diet alone or with moringa seed powder (0.5% or 1%) in comparison to rats fed standard chow. Fecal cholesterol concentration was significantly higher ($p < 0.05$) in rats fed the cholesterol diet alone as compared to the control group. Moringa did not have a significant effect on serum and fecal cholesterol concentrations in rats fed standard chow. There was no significant difference in concentrations of liver and kidney parameters or relative organ weights between groups.
Conclusion: Despite popular belief of antilipemic potential, moringa seed powder increases serum cholesterol concentration, specifically LDL, in the presence of a high cholesterol diet. Moringa seed powder inhibited the fecal elimination of dietary cholesterol in rats.