

Concurrent Session 14

Removal of microcystin from water using potential probiotic lactic acid bacteria

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Background - Microcystins are cyclic heptapeptide toxins produced by several genera of freshwater cyanobacteria (blue-green algae). In addition to potent acute hepatotoxicity, microcystins are tumour promoters and possible carcinogens. Exposure to microcystins is facilitated through water and food supply and it has been associated with the illness and mortality of animals and humans. Microcystin toxins are a drinking water quality problem as they are recalcitrant to conventional water treatment. With the ongoing concern regarding the addition of chemicals to our water supply, biological decontamination is becoming more attractive. Pilot studies have indicated that food grade lactic acid bacteria may have the ability to bind microcystin thus removing it from water and reducing the risk of harmful intake by humans.¹

Objective - In this study we used current and potential probiotic lactic acid bacteria to bind microcystin-LR from drinking water.

Design - Twenty strains of lactic acid bacteria were screened for their ability to remove microcystin-LR from water samples under a variety of conditions. For specific strains, the results for viable bacteria were compared with non-viable bacteria to determine if viability has a significant impact on toxin removal.

Outcomes - A significant number of study bacteria were found to remove microcystin-LR from drinking water. Heat and acid killed bacteria in some cases had lower removal when compared with other viable bacterium samples.

References

1. Meriluoto J, Gueimonde M, Haskard CA, Spoo L, Söjvall O, Salminen S. Removal of the cyanobacterial toxin microcystin-LR by human probiotics. *Toxicon* 2005; 46: 111-114.

Dose-dependent inhibition of the post-prandial glycaemic response to a standard carbohydrate meal following incorporation of α -cyclodextrin

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Background - The glycaemic response to consumption of a meal may be modified by altering its carbohydrate composition or, alternatively, by including nutrients that change the response to existing carbohydrate components.

Objective - To evaluate dose-response effects of α -cyclodextrin, an amylase inhibitor, on glycaemic and insulinemic responses to the consumption of a standard carbohydrate meal.

Design - In a double-blind, randomized, cross-over trial, 10 healthy subjects consumed boiled white rice containing 50 g of digestible carbohydrate to which 0 (control), 2, 5 or 10 g of α -cyclodextrin was added. Plasma glucose and insulin concentrations were determined prior to, and for two hours after, consumption of each meal.

Outcomes - The area under the plasma glucose curve was negatively related to the dose of α -cyclodextrin ($r^2 = 0.97$, $P = 0.02$), with the areas being significantly reduced at the 5 g and 10 g doses compared with the control ($P < 0.05$). α -cyclodextrin did not affect the area under the plasma insulin curve ($P = 0.39$). Higher doses of α -cyclodextrin resulted in greater satiety, but were associated with reduced palatability and an increased incidence of minor gastrointestinal complaints (stomach ache, nausea, bloating).

Conclusion - α -cyclodextrin reduces the glycaemic response to a standard carbohydrate meal in a dose-dependent manner and may be useful as an ingredient for reducing the glycaemic impact of such foods.