Relative effects on faecal markers relevant to colon cancer risk between simulated Australian and Chinese diets

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The incidence of colon cancer in Australia is high but it is low in countries like China (1). This difference may relate to diet. The diet in China is higher in starch, resistant starch (RS) and lower in fat than it is in Australia. Both countries have similar levels of total dietary fibre (DF). This study aimed to compare the effects of a simulated Australian diet with a simulated low-income Chinese diet on a number of faecal markers which are thought to be important in the aetiology of colon cancer.

Two diets, each based on a 7-day menu, were constructed. The simulated Australia diet was based on the results of the 1990 survey of 3,000 individuals conducted in Victoria, using the most commonly consumed foods and the mean macronutrient profile. The low-income Chinese diet was based on the 1989 China Health and Nutrition Survey involving 16,000 individuals. The composition of the two diets is shown in the Table. Twelve human volunteers followed each diet for 3 weeks in a random cross-over design study for which all meals were provided. Markers were ingested in week 3 for estimation of transit time. Total faecal output for 5 days was collected onto dry ice during week 3. Faeces were pooled and stored at -70° C before analysis.

	Australian	Chinese
Dietary Intake *		
Energy (MJ/d)	9.0±0.6	9.0±0.6
DF (g/d)	27.0±2	27.0±1
NSP (g/d)	24.2±2	13.7±1 †
Starch (g/d)	108±7	318±20 †
RS (g/d)	5.5±0.3	12.0±0.7 †
Fat (g/d)	82±5	38±2 †
Protein (g/d)	89±6	64±4 †
Serum Cholesterol mmol/L*	5.04±0.3	4.17±0.3 ‡
Faecal Parameter *		
Output (g/d)	141±20	86±12 ‡
pH	6.63±0.05	6.51±0.04 ‡
Transit time (hr)	56±7	69±6 §
SCFA (μmol/g)	98±8	73±7 ‡
Butyrate (μmol/g)	18±2	12±1 ‡
Ammonia (μg/g)	450±42	539±52 ‡
Phenols (μg/g)	69±13	109±13 ‡
Faecal water toxicity (%)	70±8	91±4 ‡

* mean±SE, n=12; †P<0.01; ‡P<0.05; §P=0.06.

Compliance to the low fat, high starch Chinese diet was evident by a significant drop (P<0.05) in serum cholesterol.

With the exception of faecal pH, the results revealed that the simulated Australian diet produced more favourable changes to faecal markers believed to be relevant to colon cancer risk than the simulated Chinese diet ie. faster transit through the gut, increased faecal bulk and higher concentration of SCFA (including the anti-tumour agent - butyrate). Moreover, the concentrations of the potentially damaging ammonia and phenols were lowered during the simulated Australian diet. This was confirmed by a lower faecal water toxicity level.

In this study total NSP more closely related to 'beneficial' changes in bowel function than total DF intake.

These results provide no insight into why the Chinese diet might protect against colon cancer. The data does suggest, however, that inclusion in the Australian diet of 24 g per day of NSP may assist in reducing the risk of developing colon cancer.

1. Cassidy A, Bingham SA, Cummings JH. Starch intake and colorectal cancer risk: an international comparison. Br J Cancer 1994;69:937-42.