

## Abstract PMO-028 Table 1

Product	Number	Mean Na g/100 ml	Mean Na mmol/l	Median Na mmol/l	Range Na mmol/l	SD mmol/l
Tinned soups	57	0.23	100	100	52–130	21
Cup soups	48	0.22	96	96	65–148	17

**Competing interests** None declared.

## REFERENCES

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## Basic science (nutrition)

## PMO-029 PREHABILITATION PROGRAM FOR LIVER SURGERY

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**Introduction** Rehabilitation exercise programs improve recovery from surgery and quality of life. Prehabilitation improves fitness prior to surgery. This is challenging before liver resection as patients tend to be sedentary and time is limited. Our aim was to design a 4 week program, suitable for sedentary individuals, which would yield a 1.5 ml/kg/min increase (10%) in the relative VO<sub>2</sub> uptake at the anaerobic threshold (AT), as measured by a cardiopulmonary exercise test (CPET).

**Methods** Interval based exercise program of 12 sessions on a stationary bike. Each session 40 min long consisting of six intervals, warm up and cool down. The interval intensities were calculated using anaerobic threshold detected by initial CPET. AT is independent of volition and can be detected with reliability in most patients. This represents a measure for designing exercise programs for patients. Eleven healthy volunteers completed the exercise program.

**Results** The 11 volunteers had a mean age of 46 years (range 38–60). They consisted of two men nine women. Mean BMI 30.7 (range 25.5–39.2), two smokers, nine non-smokers, no significant comorbidities. 96% attendance with 9/11 volunteers achieving 100% attendance. Mean relative VO<sub>2</sub> at AT was 12.4 ml/kg/min pre exercise program and 14.0 ml/kg/min post exercise program, a 12% improvement ( $p<0.001$ ). Mean resting O<sub>2</sub> uptake decreased by 28% ( $p=0.014$ ). There was a trend to lower resting O<sub>2</sub> pulse rate. At AT significant differences were achieved in mean O<sub>2</sub> pulse (+11.6%), and power (25.7%)  $p<0.001$ . Peak values also improved with mean peak O<sub>2</sub> pulse climbing by 10.7% ( $p=0.001$ ), and mean peak power by 14.7% ( $p=0.006$ ).

**Conclusion** This is the first 4 week exercise program designed for patients prior to liver resection and the only 4 week exercise program based round AT. It is feasible in sedentary healthy volunteers and achieves a >10% fitness improvement. An RCT is underway assessing this program's feasibility in patients prior to liver resection. Using our CPET risk stratification protocol a 10% fitness improvement in these patients would move 30% of our patients from high to low operative risk.

**Competing interests** None declared.

**PMO-030 SOLUBLE PLANT FIBRES, PARTICULARLY LEEK AND PLANTAIN, INHIBIT ADHERENCE OF DIARRHOEA-ASSOCIATED PATHOGENS *C DIFFICILE* AND ENTEROTOXIGENIC *ESCHERICHIA COLI* TO INTESTINAL EPITHELIAL CELLS**

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**Introduction** It has long been thought that dietary fibre promotes intestinal health and we have previously shown that the soluble non-starch polysaccharide (NSP) from plantain bananas (*Musa* spp.) can inhibit the epithelial adhesion and microfold (M)-cell translocation of Crohn's-associated *Escherichia coli* (Gut 2010;**59**:1331–9) and a range of diarrhoeal pathogens including *Salmonella* and *Shigella* (Gut 2011;**60**:A96). Here we examined NSP from representative examples of monocotyledon and dicotyledon plant fibres, for efficacy to inhibit epithelial interactions of *Clostridium difficile*, a major cause of antibiotic associated diarrhoea, and enterotoxigenic *E coli* (ETEC), the commonest cause of traveller's diarrhoea.

**Methods** Human intestinal epithelial cell-line Caco2-cl1 cell monolayers were pre-treated for 30 min with NSP preparations, including those from vegetable (broccoli, leek), fruit (plantain, apple) and cereal (oat) sources, followed by infection with *C. difficile* (for 2 h, at multiplicity of infection MOI of 100) or ETEC (4 h; MOI 100). In parallel experiments, adherence of bacteria to cell monolayers was examined following fixation, Giemsa stain and light microscopy.

**Results** *C difficile* adhesion to Caco2-cl1 cells was significantly inhibited in the presence of broccoli, leek and plantain NSP. Leek NSP, at 5 mg/ml, had the most significant effect on inhibition of *C difficile* adhesion (54.9±9.7% reduction) compared to untreated controls ( $n=3-9$ ,  $p<0.001$ , ANOVA). Neither apple nor oat NSP had any significant ability to prevent *C difficile* adhesion to CaCo2-cl1 cells. ETEC adhesion to CaCo2-cl1 cells was also significantly inhibited in the presence of leek NSP (53.7±13.6%;  $p<0.01$ ) and plantain NSP (40.9±9.3%;  $p<0.001$ ) but no efficacy was observed for soluble broccoli, apple nor oat fibre. Blockade of adherence to Caco2-cl1 cells by NSP was also confirmed by Giemsa stain.

**Conclusion** Leek, plantain and/or broccoli NSP show efficacy at blocking *C difficile* and ETEC adhesion in a dose dependent manner to the intestinal epithelium in vitro and at concentrations readily achievable in vivo. The close proximity of *C difficile* and ETEC to the host epithelium is almost certainly essential for the release of their respective toxins and the exertion of their pathogenic effect. Disruption of bacterial-epithelial adherence to the intestinal mucosa by soluble plant fibres may therefore be of therapeutic benefit.

**Competing interests** H Simpson grant/research support from: industrial case studentship with support from Proxavis plc, C Roberts conflict with: past employee of Proxavis plc, J Rhodes consultant for: is a member of advisory boards for Atlantic, Procter and Gamble and Falk, speaker bureau with: Has received speaking honoraria from Abbott, Falk, Ferring, Glaxo Smith Kline, Procter and Gamble, Schering Plough, Shire and Wyeth, Conflict with: holds a patent with the University of Liverpool and Proxavis UK for use of a soluble fibre preparation as maintenance therapy for Crohn's disease plus a patent pending for its use in antibiotic-associated diarrhoea, B Campbell grant/research support from: grant support from Proxavis plc and the Bo & Vera Axson Johnson Foundation Ltd.