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 tend to be sedentary and time is limited. Our aim was to design a 4-week exercise program, suitable for sedentary individuals, which would yield a 1.5 ml/kg/min increase (10%) in the relative VO$_2$ uptake at 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$_2$ 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$_2$ pulse decreased by 28% (p<0.014). There was a trend to lower resting O$_2$ pulse rate. At AT significant differences were achieved in mean O$_2$ pulse (+11.6%), and power (25.7%) p<0.001. Peak values also improved with mean peak O$_2$ 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.

**References**


**Basic science (nutrition)**

**PMO-029 PREHABILITATION PROGRAM FOR LIVER SURGERY**

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**Introduction**
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 bacterial-epithelial adherence to the intestinal mucosa may therefore be of therapeutic benefit.

**Competing interests**

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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 diarrheal 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 50 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±18.6%; p<0.01) and plantain NSP (40.9±9.3%; p<0.001) but no efficacy was observed for soluble broccoli, apple or 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 Provexis plc, C Roberts conflict with: past employee of Provexis 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, Glico Smith Kline, Procter and Gamble, Schering Plough, Shire and Wyeth, Conflict with: holds a patent with the University of Liverpool and Provexis 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 Provexis plc and the Bo & Vera Axson Johnson Foundation Ltd.