

**Large Bowel Fermentation :Its Role in Release of Gut Hormone  
and Appetite Control**

**by**

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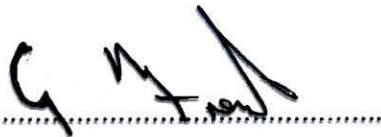


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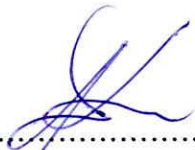
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## ABSTRACT

The aim of this study was to determine the effect of large bowel fermentation on gut hormone release and appetite control. Seventy six colectomised (surgical resection of any extent of the large intestine ie colon and rectum) subjects with a history of a carcinoma of the colon, and currently in complete remission were compared with age, sex and BMI matched controls. A standard breakfast meal and lactulose followed by an *ad libitum* lunch was provided. Breath hydrogen concentrations, and hunger and satiety levels were recorded at -30 min, 60 min, 120 min, 180 min, 240 min, 300 min from the time of the breakfast meal. Hunger and satiety levels were recorded at 330 min as well. Blood samples were obtained from a sub-sample of subjects to determine PYY and GLP1 concentrations by radioimmuno assay at -30 min, 60 min, 120 min and 180 min. Comparisons were done using independent sample t-tests and Mann Whitney U statistics. Correlational analyses were done using Pearson and Spearman correlation coefficients. The energy intake of subjects at the buffet meal was significantly less than that of the matched controls ( $p<0.001$ ). In general, in the subjects, the hunger levels were lower than the controls before the buffet meal, but statistically significant only at 180 minutes ( $p=0.004$ ). Although previous experiments suggest the large bowel to be a satiety producing organ, in this study after removal of parts of large bowel, satiety remained unchanged at most time points implying that factors that are produced by altered bowel length maintain satiety and reduce the hunger levels. In general, the mean GLP1 and PYY and the incremental area under the curve (IAUC) for plasma GLP1 and PYY concentrations in subjects were higher than that of the controls but the differences were not statistically significant. In the subjects, the

differences in GLP1 concentrations between baseline and 60 min following the standard meal as a percent of baseline values were higher as compared to that of the controls ( $p=0.014$ ). Differences in PYY concentrations between baseline, and 60 min and 120 min following the standard meal as a percent of baseline values in the subjects was higher than the controls respectively ( $p=0.009$  and  $p=0.039$ ). The IAUC for plasma PYY concentrations were significantly higher in the subjects than in the controls between -30-60 min and 60-120 min. Generally, the breath hydrogen concentration was higher in the subjects than in the controls, and significant at 60 min ( $p=0.019$ ) and 120 min ( $p=0.021$ ). Gut fermentation in colectomised subjects occurred at a higher rate at certain time points coinciding with changes in PYY and GLP1 concentrations. Breath hydrogen concentrations at 120 min, 180 min and 270 min were significantly correlated with the IAUC for GLP1 between 60-120 min. This implies that, in subjects, factors produced during bowel fermentation may account for the significant reduction in the energy intake, lower hunger levels at 180 min and in the maintenance of satiety. The findings of this study corroborates the findings of the few human studies that show a relationship between bowel fermentation, gut hormone concentrations and, hence, appetite. Subjects perceived taste ( $p=0.001$ ), pleasantness ( $p=0.011$ ) and palatability ( $p=0.026$ ) of the breakfast meal was significantly less than that in the controls. These suggest that orosensory signals may be less effective when a standard meal is taken and the factors produced as a result of fermentation or elevated PYY and the GLP1 decrease palatability. There was no significant difference in the perception of taste, pleasantness and palatability of the buffet meals between the subjects and controls suggesting that the orosensory inputs play a greater role in the sense of palatability than the influence from either the colon or the rectum.