**Supplementary Table 1**. Bowel preparation adequacy and colonoscopy indications and findings.

|  | **Complete cases (N=59)** | **Lost to follow up (N=20)** | **All cases (N=79)** |
| --- | --- | --- | --- |
| **Bowel preparation adequacy, yes n(%) a** |  |  |  |
| Fair | 15 (25%) | 5 (25%) | 20 (25%) |
| Good | 37 (63%) | 11 (55%) | 48 (61%) |
| Excellent | 7 (12%) | 4 (20%) | 11 (14%) |
| **Indication for colonoscopy, yes n(%)** |  |  |  |
| Positive faecal occult blood test | 24 (41%) | 6 (30%) | 30 (38%) |
| Surveillance colonoscopy c | 19 (32%) | 1 (5%) | 20 (25%) |
| Other symptoms e | 18 (31%) | 8 (40%) | 26 (33%) |
| Change in bowel habits b | 5 (9%) | 7 (35%) | 12 (15%) |
| Iron-deficiency anaemia | 5 (9%) | 1 (5%) | 6 (8%) |
| Suspected lesions d | 2 (3%) | 0 (0%) | 2 (3%) |
| **Colonoscopy outcome, yes n(%) f** |  |  |  |
| No abnormalities detected | 12 (20%) | 7 (35%) | 19 (24%) |
| Diverticular disease | 18 (31%) | 4 (20%) | 22 (28%) |
| Polyps | 37 (63%) | 9 (45%) | 46 (58%) |
| Other g | 16 (27%) | 8 (40%) | 24 (30%) |
| *Notes:*  *a Based on an overall Boston Bowel Preparation Scale score.*  *b Change in bowel habit(s) includes frequent stools, diarrhoea, faecal incontinence.*  *c Surveillance includes for family history, previous polyps, previous gastric surgery.*  *d Clinically or radiologically detected lesions included thickened area on scans and possible rectal mass detected; detected lesions were not associated with a cancer diagnosis.*  *e Other symptoms included abdominal pain, peri-rectal bleeding, haemorrhoids, anorectal pain, weight loss, vomiting, bloating, pain on defecation.*  *f Some participants received more than one diagnosis after colonoscopy, therefore percentages exceed 100%.*  *g Other outcomes included haemorrhoids, granular mucosa, and muscle hypertrophy.* | | | |

**Supplementary Table S2.** Unadjusted and adjusted models of the change in beta-diversity of faecal samples collected one week before and one month after bowel preparation and colonoscopy using the Aitchison distance metric.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Aitchison distance** | | | | |
| *Predictors* | *Df* | *Sum of squares* | *R2* | *F* | *p-value* |
| **Unadjusted model** | | | | | |
| Time point | 1 | 1975 | 0.004 | 0.441 | **0.001** |
| Residual | 116 | 519339 | 0.996 |  |  |
| Total | 117 | 521314 | 1.000 |  |  |
| **Adjusted model** | | | | | |
| Age (years) | 1 | 7610 | 0.015 | 1.749 | 0.246 |
| Sex (male) | 1 | 7228 | 0.014 | 1.661 | 0.604 |
| BMI | 1 | 7549 | 0.015 | 1.735 | 0.374 |
| Diet quality | 1 | 8891 | 0.017 | 2.043 | 0.028 |
| IBS (yes) | 1 | 5302 | 0.010 | 1.219 | 0.287 |
| Time point | 1 | 1976 | 0.004 | 0.454 | 0.001 |
| Residual | 111 | 482935 | 0.926 |  |  |
| Total | 117 | 521314 | 1.000 |  |  |
| *Note: Age at time of recruitment; BMI calculated as weight (kilograms)/height(metres)2 at time of recruitment; Diet quality measured using a Simple Dietary Questionnaire based on previous studies(37).*  *Abbreviations: BMI, body mass index; CI, confidence interval; Df, degrees of freedom; IBS, irritable bowel syndrome.* | | | | | |

**Supplementary Table S3. Adjusted analyses of the change in differential abundance of taxa at the genus level.** Taxa were adjusted for age, sex, body mass index, diet quality, and irritable bowel syndrome at baseline, and for multiple comparisons using Benjamini-Hochberg correction (q<0.05).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Family* | *Genus* | *Coefficient (SE)* | *p-value* | *q-value* |
| **Lower** | | | | |
| Lachnospiraceae | Unidentified | −0.36 (0.09) | <0.001 | <0.001 |
| **Higher** | | | | |
| Propionibacteriaceae | Cutibacterium | 0.30 (0.04) | <0.001 | <0.001 |
| Prevotellaceae | Prevotella 9 | 0.24 (0.07) | 0.001 | 0.001 |
| Veillonellaceae | Megamonas | 0.23 (0.03) | <0.001 | <0.001 |
| Flavobacteriaceae | Uncultured | 0.23 (0.03) | <0.001 | <0.001 |
| Uncultured | Unidentified | 0.22 (0.03) | <0.001 | <0.001 |
| Unidentified | Unidentified | 0.21 (0.05) | <0.001 | <0.001 |
| Ruminococcaceae | Ruminococcaceae UCG-009 | 0.21 (0.05) | <0.001 | <0.001 |
| Burkholderiaceae | Oxalobacter | 0.21 (0.06) | <0.001 | 0.001 |
| Lachnospiraceae | Lactonifactor | 0.20 (0.06) | 0.001 | 0.001 |
| Ruminococcaceae | CAG 352 | 0.20 (0.05) | <0.001 | 0.001 |
| Christensenellaceae | Unidentified | 0.20 (0.04) | <0.001 | <0.001 |
| Lachnospiraceae | GCA 900066575 | 0.20 (0.05) | <0.001 | 0.001 |
| Eubacteriaceae | Eubacterium | 0.19 (0.05) | <0.001 | 0.001 |
| Eggerthellaceae | Uncultured | 0.19 (0.04) | <0.001 | <0.001 |
| Eggerthellaceae | Gordonibacter | 0.19 (0.04) | <0.001 | <0.001 |
| Erysipelotrichaceae | Solobacterium | 0.17 (0.04) | <0.001 | <0.001 |
| Rikenellaceae | Rikenellaceae RC9 gut group | 0.16 (0.05) | 0.001 | 0.001 |
| Uncultured | Gut metagenome | 0.16 (0.04) | 0.001 | 0.001 |
| Saccharimonadaceae | Uncultured | 0.16 (0.05) | 0.001 | 0.001 |
| Lachnospiraceae | Lachnospiraceae UCG-010 | 0.15 (0.04) | 0.001 | 0.001 |
| Veillonellaceae | Megasphaera | 0.14 (0.04) | 0.001 | 0.001 |

**Supplementary Table S4.** **Adjusted analyses of the change in differential abundance of MetaCyc pathways.** Analyses were further adjusted for age, sex, body mass index, diet quality, and irritable bowel syndrome at baseline, and for multiple comparisons using Benjamini-Hochberg correction (q<0.05).

|  |  |  |  |
| --- | --- | --- | --- |
| *Pathway* | *Coefficient (SE)* | *p-value* | *q-value* |
| **Higher** | |  | |
| PWY.5741 | 0.43 (0.08) | <0.001 | <0.001 |
| PWY.3801 | 0.41 (0.06) | <0.001 | <0.001 |
| LPSSYN.PWY | 0.39 (0.10) | <0.001 | <0.001 |
| PWY.6728 | 0.38 (0.09) | <0.001 | <0.001 |
| PWY.1422 | 0.37 (0.05) | <0.001 | <0.001 |
| PWY.6397 | 0.37 (0.05) | <0.001 | <0.001 |
| PWY.6731 | 0.30 (0.06) | <0.001 | <0.001 |
| PWY.7031 | 0.29 (0.07) | <0.001 | <0.001 |
| PWY.4361 | 0.29 (0.06) | <0.001 | <0.001 |
| PWY.7527 | 0.28 (0.07) | <0.001 | <0.001 |

**Supplementary Table S5. Associations between the change in depressive symptom scores and change in the relative abundance of taxa at the genus level one month after bowel preparation and colonoscopy compared to baseline.** Linear regression analyses were adjusted for age, sex, body mass index, diet quality, irritable bowel syndrome at baseline, and for multiple comparisons using Benjamini-Hochberg correction (q<0.05).

|  |  |  |  |
| --- | --- | --- | --- |
| *Genus* | *Coefficient (SE)* | *p-value* | *q-value* |
| **Negatively associated** | | | |
| Ruminococcaceae UCG-009 | -0.94 (0.23) | <0.001 | 0.028 |
| Harryflintia | -0.57 (0.19) | 0.004 | 0.215 |
| Unidentified | -0.36 (0.17) | 0.036 | 0.841 |
| Uncultured | -0.23 (0.08) | 0.005 | 0.215 |
| Klebsiella | -0.14 (0.05) | 0.006 | 0.230 |
| **Positively associated** | | | |
| Granulicatella | 0.22 (0.10) | 0.036 | 0.841 |
| Uncultured | 0.15 (0.04) | 0.001 | 0.103 |
| Haemophilus | 0.13 (0.06) | 0.044 | 0.841 |

**Supplementary Material**

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