**Online Supporting Material**

Supplemental Table 1. Environmental enteric dysfunction (EED) score development principal component analysis component loadings [from (24)].

|  |  |  |  |
| --- | --- | --- | --- |
| **Biomarker**‡ | **Systemic inflammation** | **Gut inflammation score** | **Gut permeability score** |
| MPO | 0.36 | -0.42 | 0.10 |
| AAT | 0.29 | -0.60 | -0.12 |
| NEO | 0.10 | 0.46 | -0.05 |
| GLP-2 | -0.13 | 0.20 | 0.73 |
| EndoCAb IgG | -0.01 | 0.30 | -0.65 |
| CRP | 0.63 | 0.21 | 0.02 |
| AGP | 0.60 | 0.29 | 0.13 |

†AAT, α-1 antitrypsin;AGP, α-1 acid glycoprotein;CRP, C-reactive protein;EED, environmental enteric dysfunction;EndoCAb IgG, endotoxin core antibody immunoglobulin G;GLP-2, glucagon-like peptide-2;GP, gut permeability score;MPO, myeloperoxidase; NEO, neopterin.

‡Biomarkers were log-transformed and outliers removed prior to analysis.

§For this study, GI and GP scores were multiplied by -1 following the score development process to orient them such that higher values are indicative of worse intestinal health.

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Supplemental Table 2. Pearson correlation coefficients between markers of EED measured at 18 month and anthropometry

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Anthropometric Measure** | **Biomarker** | **Correlation Coefficient** | | |
| **Δ15-18 mo** | **18 mo** | **Δ18-24 mo** |
| LAZ | Lactulose‡ | 0.07 | 0.04 | -0.02 |
| Mannitol‡ | 0.00 | 0.07 | 0.02 |
| MPO | 0.03 | -0.02 | 0.01 |
| AAT | 0.03 | -0.05 | -0.03 |
| NEO | 0.12\*\*\* | 0.05 | -0.04 |
| EndoCAb | 0.08\* | 0.06 | -0.09\*\* |
| GLP-2 | 0.04 | -0.12\*\*\* | -0.02 |
| WLZ | Lactulose | -0.05 | -0.02 | -0.05 |
| Mannitol | -0.00 | 0.07 | -0.05 |
| MPO | -0.00 | -0.02 | -0.05 |
| AAT | -0.07 | 0.01 | -0.08\* |
| NEO | -0.05 | 0.04 | 0.01 |
| EndoCAb | -0.14\*\*\* | 0.02 | 0.04 |
| GLP-2 | 0.03 | -0.15\*\*\* | 0.16\*\*\* |
| WAZ | Lactulose | -0.01 | 0.01 | -0.06 |
| Mannitol | -0.01 | 0.09\* | -0.02 |
| MPO | 0.02 | -0.02 | -0.06 |
| AAT | -0.06 | -0.01 | -0.12\*\*\* |
| NEO | 0.02 | 0.06 | -0.02 |
| EndoCAb | -0.10\*\* | 0.05 | -0.01 |
| GLP-2 | 0.06 | -0.17\*\*\* | 0.14\*\*\* |

†AAT, α-1 antitrypsin;EED, environmental enteric dysfunction; EndoCAb IgG, endotoxin core antibody immunoglobulin G;GLP-2, glucagon-like peptide-2;LAZ, length-for-age Z-score; MPO, myeloperoxidase; NEO, neopterin; WAZ, weight-for-age Z-score; WLZ, weight-for-length Z-score

‡Recovery ratio.

§Stars indicate statistical significance of pairwise correlation: \*\*\*, p≤0.01; \*\*, 0.01<p≤0.05; \*, 0.05<p≤0.10.

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Supplemental Table 3. Associations between individual biomarkers of EED assessed at age 18 months and repeated anthropometric measures from 15 to 24 months in longitudinal mixed effects regression models‡

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Anthro. Measure** | **Biomarker**§ | **15-mo anthro. difference per 1-SD difference in biomarker**|| | | **15-18 mo. monthly growth velocity difference per 1-SD difference in biomarker**¶ | | **18-24 mo. monthly growth velocity difference per 1-SD difference in biomarker**†† | | **P-value from likelihood ratio test for biomarker**‡‡ |
| **β** | **SE** | **β** | **SE** | **β** | **SE** |
| LAZ | Lactulose§§ | 0.01 | 0.05 | 0.01 | 0.01 | -0.00 | 0.00 | 0.365 |
| Mannitol§§ | 0.05 | 0.05 | 0.00 | 0.01 | 0.00 | 0.00 | 0.605 |
| MPO | -0.03 | 0.05 | 0.00 | 0.01 | 0.00 | 0.00 | 0.873 |
| AAT | -0.07 | 0.05 | 0.00 | 0.01 | -0.00 | 0.00 | 0.409 |
| NEO | -0.00 | 0.05 | 0.02\*\*\* | 0.01 | -0.00 | 0.00 | 0.056 |
| EndoCAb | 0.02 | 0.05 | 0.01 | 0.01 | -0.01 | 0.00 | 0.214 |
| GLP-2 | -0.12\*\*\* | 0.05 | 0.00 | 0.01 | -0.00 | 0.00 | 0.060 |
| WLZ | Lactulose | 0.01 | 0.05 | -0.01 | 0.01 | -0.00 | 0.00 | 0.448 |
| Mannitol | 0.05 | 0.05 | 0.00 | 0.01 | -0.01 | 0.00 | 0.537 |
| MPO | -0.02 | 0.04 | -0.00 | 0.01 | -0.01 | 0.00 | 0.397 |
| AAT | 0.06 | 0.04 | -0.01 | 0.01 | -0.01\* | 0.00 | 0.034 |
| NEO | 0.08 | 0.04 | -0.01 | 0.01 | 0.00 | 0.00 | 0.335 |
| EndoCAb | 0.10\*\* | 0.04 | -0.03\*\*\* | 0.01 | 0.00 | 0.00 | 0.019 |
| GLP-2 | -0.15\*\*\* | 0.04 | 0.01 | 0.01 | 0.02\*\*\* | 0.00 | 0.000 |
| WAZ | Lactulose | 0.02 | 0.05 | -0.00 | 0.01 | -0.00 | 0.00 | 0.643 |
| Mannitol | 0.07 | 0.05 | -0.00 | 0.01 | -0.00 | 0.00 | 0.567 |
| MPO | -0.03 | 0.05 | 0.00 | 0.01 | -0.00 | 0.00 | 0.434 |
| AAT | 0.01 | 0.04 | -0.01 | 0.01 | -0.01\*\*\* | 0.00 | 0.007 |
| NEO | 0.06 | 0.05 | 0.00 | 0.01 | -0.00 | 0.00 | 0.502 |
| EndoCAb | 0.08\* | 0.05 | -0.01\*\* | 0.01 | -0.00 | 0.00 | 0.096 |
| GLP-2 | -0.17\*\*\* | 0.05 | 0.01 | 0.01 | 0.01\*\*\* | 0.00 | 0.000 |

†AAT, α-1 antitrypsin;EED, environmental enteric dysfunction; EndoCAb IgG, endotoxin core antibody immunoglobulin G;GLP-2, glucagon-like peptide-2;LAZ, length-for-age Z-score; MPO, myeloperoxidase; NEO, neopterin; SI, systemic inflammation; WAZ, weight-for-age Z-score; WLZ, weight-for-length Z-score

‡Values are coefficients and standard errors from mixed effects linear regression models with a continuous biomarker term, continuous age term, spline term for age after 18 months, interactions between the continuous biomarker and the age and age spline terms, and random intercepts and random slopes for each child. Models were developed separately for each biomarker. The LAZ models were adjusted for child sex, dichotomous living standards index (LSI) and interactions between LSI and age spline terms, and assigned supplementation group. WAZ and WLZ models were adjusted for sex, dichotomous LSI and supplementation group.

§All biomarkers were log-transformed, centered at their mean values and standardized to standard deviation units.

||Coefficient for continuous biomarker term in mixed effects model, which indicates shift in baseline (15 mo) anthropometric measure with each SD change in biomarker value.

¶Coefficient for interaction term for continuous biomarker by continuous age interaction in mixed effects model. This term indicates the shift in the monthly rate of change in the anthropometric measure with age prior to 18 mo for each SD change in biomarker value.

††Coefficient for interaction term for continuous biomarker by age spline interaction in mixed effects model. This term indicates the shift in the monthly rate of change in the anthropometric measure with age after 18 mo for each SD change in biomarker value.

‡‡P-value for the likelihood ratio test for the addition of the biomarker, biomarker-age interaction and biomarker-age spline interaction terms to the mixed effects regression model.

§§Recovery ratio

¶¶Stars indicate statistical significance of the individual coefficient in the ME model: \*\*\*, p≤0.01; \*\*, 0.01<p≤0.05; \*, 0.05<p≤0.10. Stars are not displayed if the overall LR test p-value is >0.10.