Electronic Supplementary Information

**Red cabbage modulates composition and co-occurrence networks of gut microbiota in a rodent diet-induced obesity model**

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**Table S1.** Primer sequence used for microbial analysis by real-time PCR.

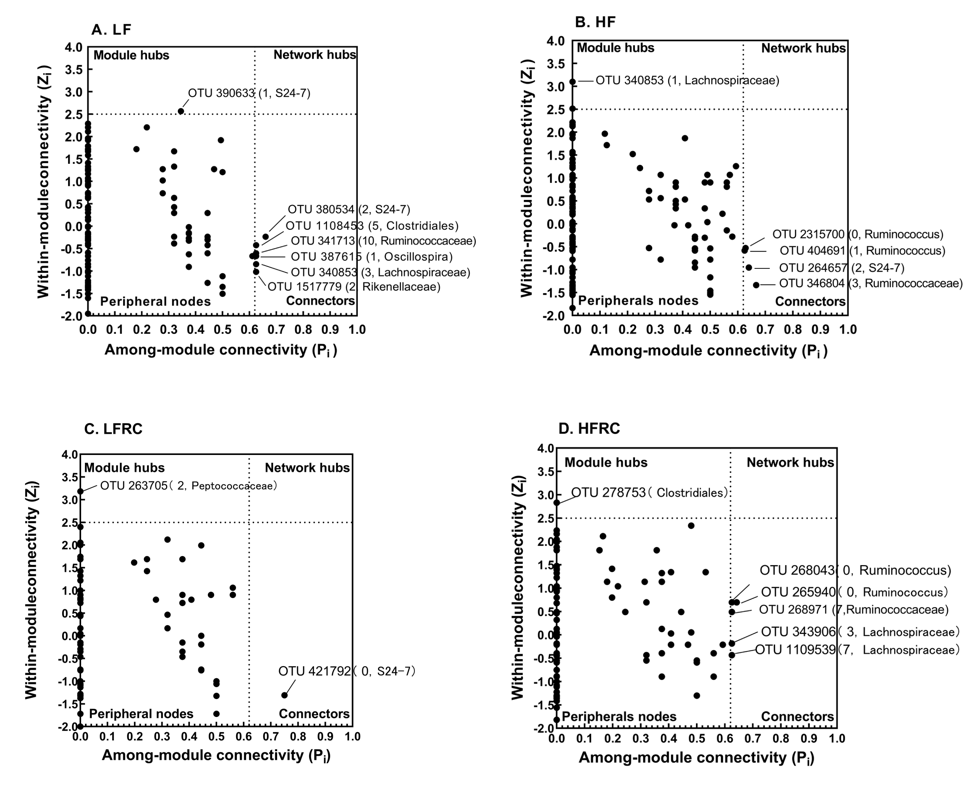
|  |  |  |
| --- | --- | --- |
| **Bacteria** | **Direction** | **Sequence (5′–3′)** |
| Bacteroidetes | Forward | GGARCATGTGGTTTAATTCGATGAT |
| Reverse | AGCTGACGACAACCATGCAG |
| Firmicutes | Forward | GGAGYATGTGGTTTAATTCGAAGCA |
| Reverse | AGCTGACGACAACCATGCAC |
| *Prevotella* | Forward | TCCTACGGGAGGCAGCAGT |
| Reverse | CAATCGGAGTTCTTCGTG |
| *Enterobacteriaceae* | Forward | CATTGACGTTACCCGCAGAAGAAGC |
| Reverse | CTCTACGAGACTCAAGCTTGC |
| *Ruminococcus* | Forward | GGCGGCCTACTGGGCTTT |
| Reverse | CCA GGT GGA TAA CTT ATT GTG TTAA |
| *Bifidobacteria* | Forward | TCGCGTCYGGTGTGAAAG |
| Reverse | CCACATCCAGCRTCCAC |
| *Lactobacillus* | Forward | GAGGCAGCAGTAGGGAATCTTC |
| Reverse | GGCCAGTTACTACCTCTATCCTTCTTC |
| *Akkermansia muciniphila* | Forward | CAGCACGTGAAGGTGGGGAC |
| Reverse | CCT TGCGGTTGGCTTCAGAT |

**Table S2.** Relative abundance (%) of the bacterial taxa at phylum level in cecal samples of mice grouped by diet (LF: LF diet, HF: HF diet, LFRC: LF diet supplemented with RC powder, HFRC: HF diet sup-plemented with RC powder).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Phylum | Diet | | | |
| LF | HF | LFRC | HFRC |
| Bacteroidetes | 60. 00±2. 45 | 53. 47±6. 21 | 47. 31±10. 30 | 42. 6±6. 53 |
| Firmicutes | 34. 41±2. 19 | 39. 19±5. 92 | 42. 17±11. 50 | 50. 58±7. 34 |
| Proteobacteria | 3. 18±0. 61 | 4. 78±0. 26 | 2. 57±0. 61 | 3. 81±0. 68 |
| Deferribacteres | 2. 17±0. 78 | 2. 38±1. 24 | 4. 06±1. 43 | 2. 93±1. 09 |
| TM7 | 0. 08±0. 04 | 0. 09±0. 11 | 0. 09±0. 09 | 0. 05±0. 04 |
| Actinobacteria | 0. 01±0. 00 | 0. 01±0. 00 | 0. 02±0. 01 | 0. 02±0. 01 |

**Table S3.** The topological properties of the global network are inferred by using the network pipeline based on random matrix theory (RMT) under various experimental conditions.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Network Indexes** | **LF** | **HF** | **LFRC** | **HFRC** |
| Total nodes | 247 | 245 | 233 | 217 |
| Total links | 416 | 483 | 314 | 406 |
| Total modules | 23 | 23 | 38 | 27 |
| Modularity (M) | 0. 819 | 0. 72 | 0. 772 | 0. 704 |
| R square of power-law | 0. 71 | 0. 80 | 0. 818 | 0. 825 |
| Average degree (avgK) | 3. 368 | 3. 94 | 2. 695 | 3. 742 |
| Average clustering coefficient (avgCC) | 0. 304 | 0. 32 | 0. 145 | 0. 17 |
| Average path distance (GD) | 8. 217 | 6. 97 | 6. 603 | 4. 905 |
| Geodesic efficiency (E) | 0. 166 | 0. 20 | 0. 2 | 0. 261 |
| Harmonic geodesic distance (HD) | 6. 039 | 4. 92 | 4. 992 | 3. 826 |
| Maximal degree | 13 | 16 | 12 | 15 |
| Nodes with max degree | OTU 262625 | OTU 1136443  OTU 1684221  OTU 329790  OTU 317633 | OTU 263705 | OTU 336691 |
| Centralization of degree (CD) | 0. 039 | 0. 05 | 0. 04 | 0. 053 |
| Maximal betweenness | 6815. 31 | 4996. 26 | 3378. 541 | 2751. 546 |
| Nodes with max betweenness | OTU 262677 | OTU 275366 | OTU 275366 | OTU 339031 |
| Centralization of betweenness (CB) | 0. 204 | 0. 15 | 0. 114 | 0. 11 |
| Maximal stress centrality | 48167 | 33304 | 20539 | 31008 |
| Nodes with max stress centrality | 262677 | 418501 | 275366 | 339031 |
| Centralization of stress centrality (CS) | 1. 451 | 1. 04 | 0. 713 | 1. 262 |
| Maximal eigenvector centrality | 0. 355 | 0. 31 | 0. 435 | 0. 31 |
| Nodes with max eigenvector centrality | OTU 353012 | OTU 317633 | OTU 263705 | OTU 277208 |
| Centralization of eigenvector centrality (CE) | 0. 335 | 0. 28 | 0. 416 | 0. 279 |
| Density (D) | 0. 014 | 0. 02 | 0. 012 | 0. 017 |
| Reciprocity | 1. 00 | 1. 00 | 1. 00 | 1. 00 |
| Transitivity (Trans) | 0. 359 | 0. 35 | 0. 182 | 0. 214 |
| Connectedness (Con) | 0. 78 | 0. 63 | 0. 515 | 0. 481 |
| Efficiency | 0. 987 | 0. 98 | 0. 985 | 0. 972 |
| Hierarchy | 0. 00 | 0. 00 | 0. 00 | 0. 00 |
| Lubness | 1. 00 | 1. 00 | 1. 00 | 1. 00 |



**Fig. S1.** The Zi-Pi diagram shows the distribution of the topological role of OTU in the network. Each point represents an OTU under different dietary groups (LF: LF diet, HF: HF diet, LFRC: LF diet with RC powder, HFRC: HF diet with RC powder). According to the scatter diagram of in-tra-module connectivity (Zi) and inter-module connectivity (Pi), the topological function of each OTU is determined. The module hub and connector are marked with OTU number. In parentheses are the module number and phylogenetic associations