Supplementary table 1. The abundance of \textit{A. muciniphila} in different intestinal disease

| Disease                         | Host        | The abundance of \textit{A. muciniphila} | reference |
|---------------------------------|-------------|------------------------------------------|-----------|
| IBD                             | Human       | -                                        | 1–10      |
| IBD                             | Human       | +                                        | 11        |
| CRC                             | Human       | +                                        | 12–15     |
|                                | Mice or rat | +                                        | 16–19     |
|                                | Mice        | -                                        | 20        |
| Celiac disease                  | Human       | -                                        | 21,22     |
| Constipation                    | Mice        | -                                        | 23–25     |
| \textit{Clostridium difficile}  | Human       | +                                        | 26–30     |
| infection                       | Human       | -                                        | 31        |
| \textit{Salmonella Typhimurium} | Mice        | +                                        | 32–35     |
| infection                       |             |                                          |           |
| \textit{Escherichia coli}       | Rat         | -                                        | 36        |

Reference

1. Ponce-Alonso, M. \textit{et al.} An Immunologic Compatibility Testing Was Not Useful for Donor Selection in Fecal Microbiota Transplantation for Ulcerative Colitis. \textit{Frontiers in immunology} \textbf{12}, 683387 (2021).
2. Zhang, T. \textit{et al.} Alterations of \textit{Akkermansia muciniphila} in the inflammatory bowel disease patients with washed microbiota transplantation. \textit{Applied microbiology and biotechnology} \textbf{104}, 10203–10215 (2020).
3. Earley, H. \textit{et al.} The abundance of \textit{Akkermansia muciniphila} and its relationship with sulphated colonic mucins in health and ulcerative colitis. \textit{Scientific reports} \textbf{9}, 15683 (2019).
4. He, C. \textit{et al.} Characteristics of mucosa-associated gut microbiota during treatment in Crohn’s disease. \textit{World journal of gastroenterology} \textbf{25}, 2204–2216 (2019).
5. Magro, D. O. \textit{et al.} Remission in Crohn’s disease is accompanied by alterations in the gut microbiota and mucins production. \textit{Scientific reports} \textbf{9}, 13263 (2019).
6. Lopez-Siles, M. \textit{et al.} Alterations in the Abundance and Co-occurrence of \textit{Akkermansia muciniphila} and \textit{Faecalibacterium prausnitzii} in the Colonic Mucosa of Inflammatory Bowel Disease Subjects. \textit{Frontiers in cellular and infection microbiology} \textbf{8}, 281 (2018).
7. Roche-Lima, A. \textit{et al.} The Presence of Genotoxic and/or Pro-inflammatory Bacterial Genes in Gut Metagenomic Databases and Their Possible Link With Inflammatory Bowel Diseases. \textit{Frontiers in genetics} \textbf{9}, 116 (2018).
8. Bajer, L. \textit{et al.} Distinct gut microbiota profiles in patients with primary sclerosing cholangitis and ulcerative colitis. \textit{World journal of gastroenterology} \textbf{23}, 4548–4558 (2017).
9. Dunn, K. A. \textit{et al.} Early Changes in Microbial Community Structure Are Associated With Sustained Remission After Nutritional Treatment of Pediatric Crohn’s Disease. \textit{Inflammatory bowel diseases} \textbf{22}, 2853–2862 (2016).
10. Rajilić-Stojanović, M., Shanahan, F., Guarner, F. & Vos, W. M. de. Phylogenetic analysis of dysbiosis in ulcerative colitis during remission. \textit{Inflammatory bowel diseases} \textbf{19}, 481–488 (2013).
11. Danilova, N. A. \textit{et al.} Markers of dysbiosis in patients with ulcerative colitis and Crohn’s disease. \textit{Terapevticheskii arkhiv} \textbf{91}, 17–24 (2019).
12. Osman, M. A. et al. Parvimonas micra, Peptostreptococcus stomatis, Fusobacterium nucleatum and Akkermansia muciniphila as a four-bacteria biomarker panel of colorectal cancer. *Scientific reports* **11**, 2925 (2021).

13. Campisciano, G. et al. The Obesity-Related Gut Bacterial and Viral Dysbiosis Can Impact the Risk of Colon Cancer Development. *Microorganisms* **8**, 431 (2020).

14. Han, S. et al. Adequate Lymph Node Assessments and Investigation of Gut Microorganisms and Microbial Metabolites in Colorectal Cancer. *OncoTargets and therapy* **13**, 1893–1906 (2020).

15. Sheng, Q.-S. et al. Comparison of Gut Microbiome in Human Colorectal Cancer in Paired Tumor and Adjacent Normal Tissues. *OncoTargets and therapy* **13**, 635–646 (2020).

16. Song, C.-H. et al. Changes in Microbial Community Composition Related to Sex and Colon Cancer by Nrf2 Knockout. *Frontiers in cellular and infection microbiology* **11**, 636808 (2021).

17. Lang, M. et al. Crypt residing bacteria and proximal colonic carcinogenesis in a mouse model of Lynch syndrome. *International journal of cancer* **147**, 2316–2326 (2020).

18. Wu, M. et al. The Dynamic Changes of Gut Microbiota in Muc2 Deficient Mice. *International journal of molecular sciences* **19**, 2809 (2018).

19. Xiao, X. et al. Differences Between the Intestinal Lumen Microbiota of Aberrant Crypt Foci (ACF)-Bearing and Non-bearing Rats. *Digestive diseases and sciences* **63**, 2923–2929 (2018).

20. Wang, L. et al. A purified membrane protein from Akkermansia muciniphila or the pasteurised bacterium blunts colitis associated tumourigenesis by modulation of CD8(+) T cells in mice. *Gut* **69**, 1988–1997 (2020).

21. Di Biase, A. R. et al. Gut microbiota signatures and clinical manifestations in celiac disease children at onset: a pilot study. *Journal of gastroenterology and hepatology* **36**, 446–454 (2021).

22. Bodkhe, R. et al. Comparison of Small Gut and Whole Gut Microbiota of First-Degree Relatives With Adult Celiac Disease Patients and Controls. *Frontiers in microbiology* **10**, 164 (2019).

23. Kim, M. G. et al. Prebiotics/Probiotics Mixture Induced Changes in Cecal Microbiome and Intestinal Morphology Alleviated the Loperamide-Induced Constipation in Rat. *Food science of animal resources* **41**, 527–541 (2021).

24. Ma, H. et al. Polysaccharide from Spirulina platensis ameliorates diphenoxylate-induced constipation symptoms in mice. *International journal of biological macromolecules* **133**, 1090–1101 (2019).

25. Yi, R. et al. Lactobacillus plantarum CQPC02-Fermented Soybean Milk Improves Loperamide-Induced Constipation in Mice. *Journal of medicinal food* **22**, 1208–1221 (2019).

26. Vakili, B., Fateh, A., Asadzadeh Aghdae, H., Sotoodehnejadnematalahi, F. & Siadat, S. D. Characterization of Gut Microbiota in Hospitalized Patients with Clostridioides difficile Infection. *Current microbiology* **77**, 1673–1680 (2020).

27. Vakili, B., Fateh, A., Asadzadeh Aghdaei, H., Sotoodehnejadnematalahi, F. & Siadat, S. D. Intestinal Microbiota in Elderly Inpatients with Clostridioides difficile Infection. *Infection and drug resistance* **13**, 2723–2731 (2020).

28. Araos, R. et al. Fecal Microbiome Among Nursing Home Residents with Advanced Dementia and Clostridium difficile. *Digestive diseases and sciences* **63**, 1525–1531 (2018).
29. Hernández, M. et al. Fecal Microbiota of Toxigenic Clostridioides difficile-Associated Diarrhea. *Frontiers in microbiology* 9, 3331 (2018).

30. Sangster, W. et al. Bacterial and Fungal Microbiota Changes Distinguish C. difficile Infection from Other Forms of Diarrhea: Results of a Prospective Inpatient Study. *Frontiers in microbiology* 7, 789 (2016).

31. Rodriguez, C. et al. Longitudinal survey of Clostridium difficile presence and gut microbiota composition in a Belgian nursing home. *BMC microbiology* 16, 229 (2016).

32. Wang, R. et al. Protective Effects of Cinnamaldehyde on the Inflammatory Response, Oxidative Stress, and Apoptosis in Liver of Salmonella typhimurium-Challenged Mice. *Molecules (Basel, Switzerland)* 26, 2309 (2021).

33. Hao, S. et al. Core Fucosylation of Intestinal Epithelial Cells Protects Against Salmonella Typhi Infection via Up-Regulating the Biological Antagonism of Intestinal Microbiota. *Frontiers in microbiology* 11, 1097 (2020).

34. Xu, X. et al. Glycyrrhizin Attenuates Salmonella enterica Serovar Typhimurium Infection: New Insights Into Its Protective Mechanism. *Frontiers in immunology* 9, 2321 (2018).

35. Borton, M. A. et al. Chemical and pathogen-induced inflammation disrupt the murine intestinal microbiome. *Microbiome* 5, 47 (2017).

36. Sun, X. et al. Escherichia coli O(101)-induced diarrhea develops gut microbial dysbiosis in rats. *Experimental and therapeutic medicine* 17, 824–834 (2019).