## The supporting information

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## Tables

**Table S1** Primers used in this study.



Figure S1 HPGPC chromatogram of dextran standards and FBTPs. Dextran standards including (A) 670 kDa, (B) 410 kDa, (C) 50 kDa, (D) 12 kDa and (E) 5 kDa; (F) The calibration curve; (G) W-FBTPs; (H) A-FBTPs. \* Impurity from mobile phase.



Figure S2 Monosaccharide composition of FBTPs. (A) Monosaccharide standards of (1) Rha, (2) Fuc, (3) Ara, (4) Xyl, (5) Man, (6) Glc, (7) Gal, (8) GlcA, (9) GalA; (B) W-FBTPS; (C) A-FBTPS.



Figure S3 FT-IR spectra of FBTPs. (A) W-FBTPS; (B) A-FBTPS.



Figure S4 Effects of W-FBTPs and A-FBTPs on RAW 264.7 macrophages. (A) Effect on cell viability of RAW 264.7; (B) Effect on phagocytosis of RAW 264.7; (C) Effect on acid phosphatase activity of RAW 264.7; (D) Effect on NO secretion of RAW 264.7. W-FBTPs and A-FBTPs (100  $\mu$ L/well) at different concentrations (dissovled by fresh complete DMEM medium, final concentration of 50, 100, 200, 400 and 800  $\mu$ g/mL) were added into each well followed by incubation for 24 h, respectively. LPS (final concentration of 10  $\mu$ g/mL) was used as a positive control and the DMEM medium in the absence of polysaccharide was used as a blank control. Graph bars marked with different letters on top represent statistically significant results (p < 0.05) by a LSD test (n = 6), whereas bars labeled with the same letter correspond to results that show no statistically significant differences.



Figure S5 Effects of W-FBTPs and A-FBTPs on cytokines, intestinal mucin2 and TJ complex mRNA expression levels of CTX-induced immunosuppressive mice. The relative levels of (A) TNF- $\alpha$ , (B) IL-1 $\beta$  in thymus; (C) TNF- $\alpha$ , (D) IL-1 $\beta$  in spleen; and (E) TNF- $\alpha$ , (F) IL-1 $\beta$ , (G) Mucin2, (H) Occludin, (I) ZO-1 in colon. N, normal control group; M, model control group; WH, 100 mg/kg·BW/d of W-FBTPS group; WM, 50 mg/kg·BW/d of W-FBTPS group; WL, 25 mg/kg·BW/d of W-FBTPS group; AH, 100 mg/kg·BW/d of A-FBTPS group; AH, 50 mg/kg·BW/d of A-FBTPS group; AL, 25 mg/kg·BW/d of A-FBTPS group. The data were expressed as means±SD. Graph bars marked with different letters on top represent statistically significant results (p < 0.05) by a LSD test (n = 10), whereas bars labeled with the same letter correspond to results that show no statistically significant differences.



Figure S6 Rarefaction curves (A) and Shannon index (B).



Figure S7 Effects of W-FBTPs and A-FBTPs on the  $\alpha$ -diversities of gut microbiota. (A) Chao, (B) Ace, (C) Shannon, (D) Simpson and (E) Coverage index. Graph bars marked with different letters on top represent statistically significant results (p < 0.05) by a LSD test (n = 6), whereas bars labeled with the same letter correspond to results that show no statistically significant differences.



Figure S8 The Hierarchical cluster analysis on OTU level by unweighted\_unifrac method.



Figure S9 Comparisons of the microbial variance by LEfSe analysis from phylum to genus.

Name	Sequence
IL-1β Forward	CCTGTGTCTTTCCCGTGGAC
IL-1β Reverse	CATCTCGGAGCCTGTAGTGC
TNF-α Forward	CCAGACCCTCACACTCACAAAC
TNF-α Reverse	GTAGACAAGGTACAACCCATCG
Mucin2 Forward	CGCATGGATGGCTGTTTCTG
Mucin2 Reverse	ATTGCTCGCAGTTGTTGGTG
Occludin Forward	CTTCCAATGGCAAAGTGAATGAATGA
Occludin Reverse	CTTCCAATGGCAAAGTGAATGAATGA
ZO-1 Forward	GAGCCTAATCTGACCTATGAACC
ZO-1 Reverse	TGAGGACTCGTATCTGTATGTGG
β-actin Forward	CGGTGAAGGCGACAGCAGTTGGT
β-actin Reverse	AGGAGTGGGGGGGGGGCTTTTGGGA

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