



Extended Data Figure 6 | Effect of tungstate treatment on obligate anaerobic commensal bacteria. **a–c**, Metagenomic analysis of the caecal content of mice described in Extended Data Fig. 3b. Principal coordinates analysis of global metabolic pathway (**a**) and quantification of reads involved in fumarate respiration (**b**) and butyrate production (**c**). Ellipses in **a** denote 95% confidence interval. Data are shown as mean and s.d.; $n = 6$ per group. **d–f**, *Bacteroides thetaiotaomicron* or *Bacteroides fragilis* were cultured anaerobically in mucin broth at 37 °C for 48 h. The medium was supplemented with sodium tungstate or metronidazole as indicated. Succinate production by *B. thetaiotaomicron* (**d**) and *B. fragilis* (**f**) was

assessed by GC–MS. The growth of *B. thetaiotaomicron* was quantified by plating serial dilutions of bacterial culture on blood agar (**e**).

g, *C. symbiosum* was inoculated into chopped meat broth and incubated anaerobically at 37 °C for 36 h. Butyrate concentration in the medium was measured using GC–MS. **h**, *C. symbiosum* was cultured anaerobically in chopped meat broth at 37 °C for 48 h. The growth of *C. symbiosum* was determined by plating serial dilutions of bacterial culture on thioglycolate plates. $n = 3$ biological replicates per condition. Data are shown as geometric mean and geometric s.d. of three experiments.