Script for the video

Figure360 for Figure 5 of the article titled "Bifidobacterium or fiber protect against diet-induced microbiota-mediated colonic mucus deterioration" [*Cell Host & Microbe*]

Diet strongly shapes the gut microbiota composition, thereby potentially affecting the inner colonic mucus layer, which serves as the barrier between gut microbes and the host. Thus, we investigated the effect of a Western-style diet (or WSD) on the colonic mucus layer of mice.

After identifying a defective colonic mucus layer in mice fed a WSD, we treated mice with antibiotics and then fed them a WSD for 6 weeks. Each week, the mice received a transplant of the intestinal microbiota from mice that were fed either a WSD or standard chow. Finally, we studied the metabolic parameters, mucus function, and gut microbiota composition.

Mice receiving transplants from the WSD- or chow-fed mice did not differ in body weight, body fat, fasting blood glucose levels, or fasting insulin concentrations. However, mice that received transplants from the chow-fed mice showed significantly decreased penetrability of the colonic mucus layer in fluorescent microbead tracking experiments. Also, in these mice, the growth rate of the colonic mucus layer was elevated, indicating that the gut microbiota from chow-fed mice prevented both mucus defects.

We next measured caecal fermentation products and found that the levels of all tested products were the same in both groups. This indicated that the defects in the mucus layer did not depend on the tested microbial metabolites.

Moving on, we studied the microbial diversity by 16S rDNA analysis. Among the phyla, Firmicutes were decreased and Bacteroidetes were increased in mice that received transplants from chow-fed mice. Among the genera, *Bifidobacteria* and the S24-7 family increased, and *Allobaculum* decreased in these mice.

Phylogenetic tree analysis also showed that receiving the chow microbiota significantly increased gut bacterial diversity. This was further

confirmed by the significant separation between the two groups observed in the principal component analysis.

Collectively, our findings show that the microbiota from mice fed a fiber-rich diet prevents mucus defects, such as a reduction in growth rate and increase in the penetrability of the colonic mucus layer, in mice fed a WSD.