Lacking dietary fiber enhances sensitivity to inflammatory stimuli, that results in intestinal hyper-permeability.

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【Background and Aim】 It is difficult to cure inflammatory bowel diseases completely with current medicine, so that daily care is necessary to maintain remission state. Low residue diet is recommended to sustain remission state. However, recent studies have demonstrated that water-soluble dietary fiber improve inflammatory state in intestine. Hence, we examined the effect of fiber-free diet (FF) to colitis and verified whether dietary fiber has beneficial effect against intestinal inflammation or not.

【Methods】 Normal chow (NC) or FF were fed to 8-weeks-old male C57BL6 mice for 3 weeks. After that, we let mice intake drinking water containing 1.25 % dextran sodium sulfate (DSS) at libitum for 72h. Then, FITC-dextran was administered orally to evaluate colonic permeability. Four hours later, plasma concentration of FITC-dextran was measured. After that, mice were sacrificed and histological change in colon, microbiome and amount of short chain fatty acid in stool were evaluated.

【Results】 Colon length became short due to FF feeding regardless of DSS-administration. In addition, FF and additional DSS-administration, but not FF itself, induced hyper-permeability in colon. Both colon length and permeability were not changed in NC-fed mice after intaking DSS. Hematoxylin and eosin staining and visualization of mucus using PAS staining did not show marked histological change in colon among all groups despite of evident differences in permeability. NC+water (negative control) and NC+DSS groups had similar microbiome. Contrary to these two groups, microbiome was markedly different in FF+water and FF+DSS groups. Especially butyric acid-producing bacteria was decreased evidently by FF feeding. Actually, FF feeding diminished the concentration of butyric acid as well as acetic acid in stool.

【Conclusion】 Lacking dietary fiber enhanced sensitivity to inflammatory stimuli in colon, that are possibly resulted by change in microbiome and amount of bacterial metabolite.