Butyrate does not affect mast cell-induced hyperpermeability in human colonic mucosa

Mathias Tabat, Tatiana Milena Marques, Malin Markgren, Robert-Jan Brummer, Rebecca Wall
Nutrition-Gut-Brain Interactions Research Centre, Örebro University, Sweden

Background

The intestinal barrier is a complex multilayer structure that separates the internal milieu from the luminal environment, regulating the exchange of molecules between host and environment and protecting the organism against pathogens and toxins. An increased intestinal permeability has been associated with e.g. irritable bowel syndrome (IBS), inflammatory bowel disease (IBD) and type 2 diabetes and could thereby be of preventive or clinical interest. Butyrate is a short chain fatty acid that is produced by microbial fermentation of undigested fibres in the human colon and might be an important contributor in maintaining the intestinal barrier function.

Aim: To determine butyrate's effects on mast cell-induced hyperpermeability in colonic biopsies using an ex-vivo model

Results

Paracellular permeability

Transcellular permeability

p<0.006

Control
C48/80, 10ng/ml
5mM butyrate + C48/80
25mM butyrate + C48/80

p<0.004

Control
C48/80, 10ng/ml
5mM butyrate + C48/80
25mM butyrate + C48/80

Conclusion

Butyrate, at both concentrations, did not reduce the paracellular or transcellular hyperpermeability induced by compound 48/80 (C48/80) after 60 minutes incubation. This is in contrast to previous findings in animal experiments and cell culture models that have shown a positive effect of butyrate on barrier function, and remains to be assessed in more detail.

Method

Mucosal biopsies from the sigmoid colon of ten healthy volunteers that responded to the mast cell degranulator C48/80 were included in the study. Unstimulated biopsies were used as controls. Sodium butyrate (5 mM and 25 mM) was added to the mucosal side, and C48/80 was added to the serosal side to induce tissue hyperpermeability. FITC-dextran and horseradish peroxidase (HRP) were used as permeability markers and added to the mucosal side. Permeability at baseline and 60 minutes after the start of the experiment were measured by fluorescent measurement (FITC-dextran) and ELISA (HRP).

Contact:
mathias.tabat@oru.se