Journal of Zhejiang University-SCIENCE B

Cite this as: Joshua J. MALAGO, Catherine L. SANGU, 2015. Intraperitoneal administration of butyrate prevents the severity of acetic acid colitis in rats. *Journal of Zhejiang University-Science B (Biomedicine & Biotechnology)*, **16**(3):224-234. [doi:10.1631/jzus.B1400191]

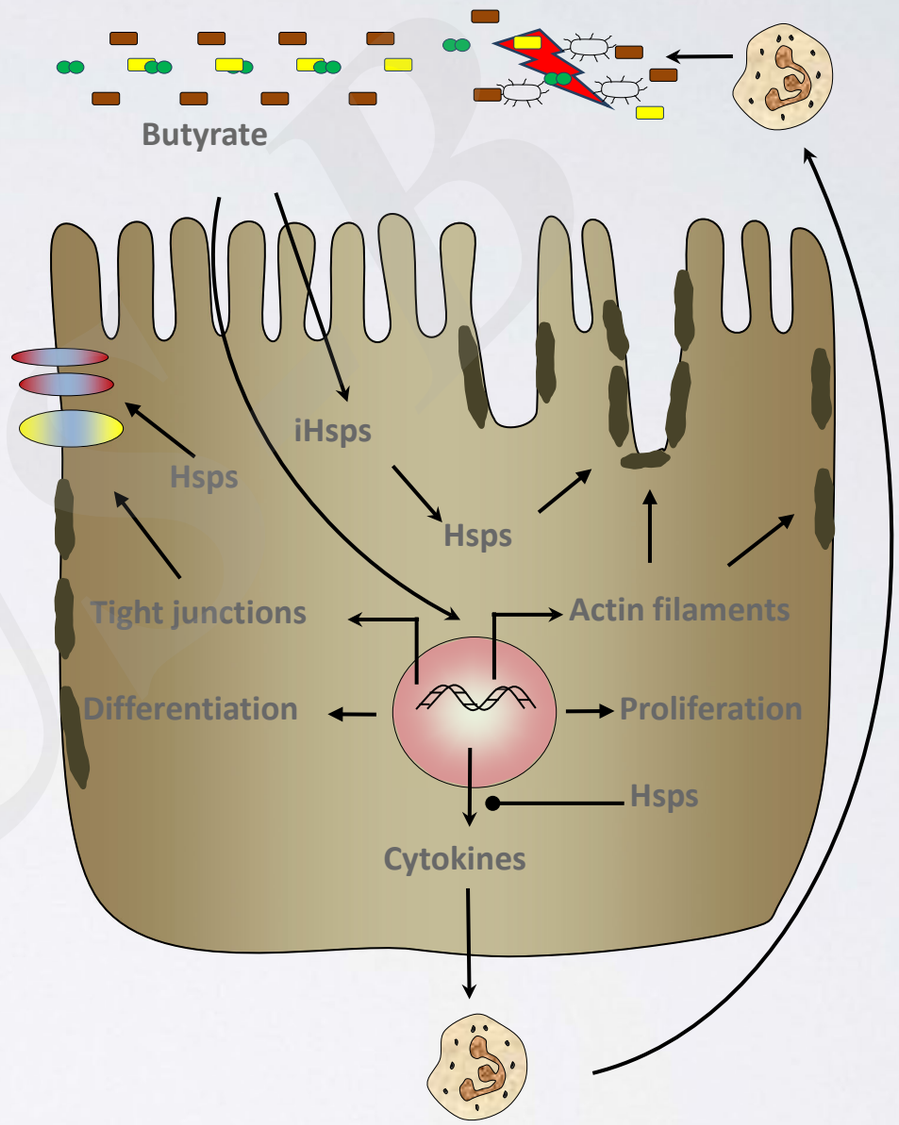
Intraperitoneal administration of butyrate prevents the severity of acetic acid colitis in rats

Key words:

Butyrate, oral, Intraperitoneal, Intrarectal, Acetic acid, Ulcerative colitis

Role of butyrate to colon immunity

Butyrate is produced from microbiotal carbohydrate fermentation process. After its uptake by colonocytes it induces production of heat shock proteins (Hsps), tight junction proteins and actin filaments that strengthen barrier integrity to protect against infection and inflammation. Hsps also inhibit pro-inflammatory cytokines that attract neutrophils to cause colitis. Butyrate-mediated differentiation of colonocytes under normal conditions and proliferation during disease play essential role for colon health (Malago et al 2002; Malago 2014).



Butyrate and Ulcerative colitis

•Deficiency of butyrate leads to ulcerative colitis (UC) which is treated by intracolonic restoration of butyrate levels.
•To confer protection, butyrate needs to be absorbed and metabolised by the colonocytes.
•However, butyrate-based treatment of UC has limited success because of:
  • variations in the levels of butyrate-induced chemokine interleukin (IL-8) which attracts neutrophils to colon mucosa to cause the disease.
  •Impaired absorption of butyrate by colonocytes due to damaged epithelial mucosa during UC

• To overcome failure of butyrate absorption and function during UC, systemic administration of butyrate that supplies butyrate to colonocytes through blood, may benefit against UC patients
•We therefore assessed severity of UC in rat model of acetic acid (AA) colitis following oral, intrarectal and intraperitoneal butyrate.

Testing of butyrate protective potency

Details in protective potency of intraperitoneal, oral, and intrarectal butyrate against acetic acid UC are discussed under following sections:

- Clinical AA colitis
- AA colitis activity index
- Gross pathology
- Histopathological findings

Main findings:

Intraperitoneal butyrate ameliorates AA-induced UC in rats

Perspectives and Research Priorities

Research Priorities:

- Further study to explore the exact mechanisms of systemic butyrate
- Elucidation of whether intraperitoneal butyrate would benefit UC patients equally or more than the topically administered butyrate.

Many details on how intraperitoneally administered butyrate reaches the colonocytes remain poorly understood, including the amount of butyrate administered and that reaching colonocytes as well as the optimal therapeutic intaperitoneal dose. Further, the exact mechanisms employed by intraperitoneal butyrate to protect colonocytes remains enigmatic. Research focusing on answering these questions may give insight into establishing sound approach to employ intraperitoneal butyrate as medicament against UC.