



Acacetin Ameliorates Experimental Colitis in Mice via Inhibiting Macrophage Inflammatory Response and Regulating the Composition of Gut Microbiota

Junyu Ren^{1†}, Bei Yue^{1†}, Hao Wang^{1†}, Beibei Zhang¹, Xiaoping Luo¹, Zhilun Yu¹, Jing Zhang¹, Yijing Ren¹, Sridhar Mani², Zhengtao Wang^{1*} and Wei Dou^{1*}

OPEN ACCESS

Edited by:

Margarita Aguilera,
University of Granada, Spain

Reviewed by:

Karen Yvonne Stokes,
Louisiana State University Health
Shreveport, United States
Naoki Asano,
Tohoku University, Japan

*Correspondence:

Zhengtao Wang
ztwang@shutcm.edu.cn;
wzhengtao@yahoo.com
Wei Dou
douwei123456@126.com

[†]These authors have contributed
equally to this work

Specialty section:

This article was submitted to
Gastrointestinal Sciences,
a section of the journal
Frontiers in Physiology

Received: 29 June 2020

Accepted: 28 December 2020

Published: 18 January 2021

Citation:

Ren J, Yue B, Wang H, Zhang B,
Luo X, Yu Z, Zhang J, Ren Y, Mani S,
Wang Z and Dou W (2021) Acacetin
Ameliorates Experimental Colitis
in Mice via Inhibiting Macrophage
Inflammatory Response
and Regulating the Composition
of Gut Microbiota.
Front. Physiol. 11:577237.
doi: 10.3389/fphys.2020.577237



¹ The MOE key Laboratory of Standardization of Chinese Medicines, Shanghai Key Laboratory of Compound Chinese Medicines, and the SATCM key Laboratory of New Resources and Quality Evaluation of Chinese Medicines, Institute of Chinese Materia Medica, Shanghai University of Traditional Chinese Medicine (SHUTCM), Shanghai, China, ² Department of Medicine and Genetics, Albert Einstein College of Medicine, The Bronx, NY, United States

Acacetin, a natural dietary flavonoid abundantly found in acacia honey and citrus fruits, reportedly exerts several biological effects, such as anti-tumor, anti-inflammatory, and anti-oxidative effects. However, the effects of acacetin on intestinal inflammation remain unclear. We sought to investigate whether acacetin ameliorates inflammatory bowel disease (IBD) in mice with dextran sulfate sodium (DSS)-induced ulcerative colitis (UC). Our results suggest that acacetin alleviates the clinical symptoms of DSS-induced colitis, as determined by body weight loss, diarrhea, colon shortening, inflammatory infiltration, and histological injury. Further studies showed that acacetin remarkably inhibited both the macrophage inflammatory response *in vitro* and levels of inflammatory mediators in mice with colitis. In addition, some features of the gut microbiota were disordered in mice with DSS-induced colitis, as evidenced by a significant reduction in microbiota diversity and a marked shift in bacterial profiles. However, acacetin treatment improved this imbalance and restored gut microbiota to levels that were similar to those in normal mice. In conclusion, our work presents evidence that acacetin attenuates DSS-induced colitis in mice, at least in part, by inhibiting inflammation and regulating the intestinal microbiota.

Keywords: ulcerative colitis, gut microbiota, inflammatory mediators, dextran sulfate sodium, acacetin

INTRODUCTION

Ulcerative colitis (UC) is a major form of inflammatory bowel disease (IBD), characterized by continuous and diffuse inflammatory lesions of the colorectal mucosa. The original distribution of UC included European and American countries. However, with the development of global industrialization, as well as changing lifestyles and the living environment, UC has gradually become a common disease worldwide. In developing countries with large populations, the incidence of UC increases each year, which causes considerable mental stress and brings an economic burden to the affected patients (Kaplan, 2015; Ananthakrishnan et al., 2018). Abdominal