# The importance of *Faecalibacterium prausnitzii* in human health and diseases

**M. Parsaei**[1], **N. Sarafraz**[1], **S. Y. Moaddab**[2] **and H. Ebrahimzadeh Leylabadlo**[2,3,4]

1) *Department of Parasitology and Mycology, Faculty of Medicine Tabriz University of Medical Sciences,* 2) *Liver and Gastrointestinal Diseases Research Center,* 3) *Student Research Committee and* 4) *Infectious and Tropical Diseases Research Center, Tabriz University of Medical Sciences, Tabriz, Iran*

**Keywords:** Diseases, *Faecalibacterium prausnitzii*, gut microbiota, health, microbiom

**Original Submission:** 4 July 2021; **Revised Submission:** 15 July 2021; **Accepted:** 19 July 2021

**Article published online:** 24 July 2021

**Corresponding author:** H. Ebrahimzadeh Leylabadlo, Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran.

**E-mail:** hamedebr7@gmail.com

*Dear Editor,*

Human gut microbiota refers to the entire population of microorganisms that colonizes a particular location; and includes not just bacteria but also other microbes such as fungi, archaea, viruses and protozoan. In recent years, it has been proven that the role of microorganism's community within the human gut is utmost of importance regarding the balance between health and disease [1,2]. *Faecalibacterium prausnitzii* is functionally considered a significant microbiota since this species of microbiota is found in many animals and humans. Based on the Meta-analysis of the Human Intestinal Tract project reports, *F. prausnitzii* (that exists about 5% in faeces is considered one of the most numerous anaerobic bacteria in the human gut microbiota [3]. *F. prausnitzii*, is an acetate consumer that produces butyrate and bioactive anti-inflammatory molecules such as shikimic and salicylic acids [4].

In that context, the change rate of *F. prausnitzii* in the gastrointestinal tracts is connected to multiple complications and syndromes; however the cause or a consequence of them is not understood clearly [5]. The abundance of *F. prausnitzii* in faeces has been investigated in some diseases like irritable bowel syndrome, Crohn's disease, ulcerative colitis, type 2 diabetes, obesity, coeliac disease, self-limited colitis, atopic diseases, chronic idiopathic diarrhoea, acute appendicitis, neuroendocrine tumours of the mid gut, liver transplantation, colorectal cancer and other diseases [6–8]. What is outstanding is the much research that has been done in patients with a lower relative abundance compared with healthy control. According to Gopalakrishnan *et al.*, the existence of *F. prausnitzii* could raise the efficacy of immune checkpoint inhibitors in melanoma patients [9].

Different researches showed that reduction of *F. prausnitzii* in the gut increases the decreased capacity of self-defence against inflammatory interactions. This protective system probably includes pro-inflammatory cytokines and is significant in the stimulation of anti-inflammatory cytokines secretion through active molecules [10]. Short-chain fatty acids (SCFAs) that are significant end-products are involved in the fermentation process of the bacteria that exist in the human colon. The main fermentation that is formed in the colon refers to the SCFAs such as acetate, propionate and butyrate that are the main non-gaseous end products in the fermentation process, and *F. prausnitzii*, as an acetate consumer produces butyrate and bioactive anti-inflammatory molecules such as shikimic and salicylic acids [11]. Even, in recent years, a broader range of useful bacteria such as butyrate-producing indigenous types has been recognized, which are expected to be new probiotic strains. A wider range of helpful bacteria, including butyrate-producing indigenous types, have been distinguished in recent years and these useful bacteria seem to be new probiotic strains.

It should be mentioned that *F. prausnitzii* is recognized as an unparalleled bacterial sensor and actor in human health because of the particular conditions, and likely it is recognized as a gut key player that has an outstanding effect on the health and physiology of the host. The fact that gut factors adjust the presence of *F. prausnitzii* in the gut and the limit of their impact is a problematic issue. It seems, modulation of gut microbiota composition likely reduces the risk of different complications. Supplementary cures and treatments to standard therapy should be investigated, including different nutritional strategies or prebiotics or probiotics that favour *F. prausnitzii* population increase.

## Transparency declaration

The authors declare no conflict of interest to disclose.



https://doi.org/10.1016/j.nmni.2021.100928

## References


[1] Leylabadlo HE, Sanaie S, Heravi FS, Ahmadian Z, Ghotaslou R. From role of gut microbiota to microbial-based therapies in type 2-diabetes. Infect Gene Evol 2020 Feb 29:104268.

[2] Leylabadlo, Ebrahimzadeh Hamed, et al. Non-alcoholic fatty liver diseases: from role of gut microbiota to microbial-based therapies. European J Clin Microbiol Infect Dis 2019:1–15.

[3] Cao Y, Shen J, Ran ZH. Association between Faecalibacterium prausnitzii reduction and inflammatory bowel disease: a meta-analysis and systematic review of the literature. Gastroenterol Res Pract 2014:2014.

[4] Sokol H, Pigneur B, Watterlot L, Lakhdari O, Bermúdez-Humarán LG, Gratadoux J-J, et al. Faecalibacterium prausnitzii is an anti-inflammatory commensal bacterium identified by gut microbiota analysis of Crohn disease patients. Proc Nat Acad Sci 2008;105(43):16731–6.

[5] Rajilić–Stojanović M, Biagi E, Heilig HG, Kajander K, Kekkonen RA, Tims S, et al. Global and deep molecular analysis of microbiota signatures in fecal samples from patients with irritable bowel syndrome. Gastroenterology 2011;141(5):1792–801.

[6] Lopez-Siles M, Duncan SH, Garcia-Gil LJ, Martinez-Medina M. Faecalibacterium prausnitzii: from microbiology to diagnostics and prognostics. ISME J 2017;11(4):841.

[7] Miquel S, Martin R, Rossi O, Bermudez-Humaran L, Chatel J, Sokol H, et al. Faecalibacterium prausnitzii and human intestinal health. Curr Opin Microbiol 2013;16(3):255–61.

[8] Leylabadlo HE, Ghotaslou R, Feizabadi MM, Farajnia S, Moaddab SY, Ganbarov K, Khodadadi E, Tanomand A, Sheykhsaran E, Yousefi B, Kafil HS. The critical role of Faecalibacterium prausnitzii in human health: an overview. Microb Pathog 2020 Jun 11:104344.

[9] Gopalakrishnan V, Spencer CN. Gut microbiome modulates response to anti-PD-1 immunotherapy in melanoma patients. Science 2018 Jan 5;359(6371):97–103.

[10] Zhang M, Qiu X, Zhang H, Yang X, Hong N, Yang Y, et al. Faecalibacterium prausnitzii inhibits interleukin-17 to ameliorate colorectal colitis in rats. PLoS One 2014;9(10):e109146.

[11] Miquel S, Leclerc M, Martin R, Chain F, Lenoir M, Raguideau S, et al. Identification of metabolic signatures linked to anti-inflammatory effects of Faecalibacterium prausnitzii. MBio 2015;6(2):e00300–15.