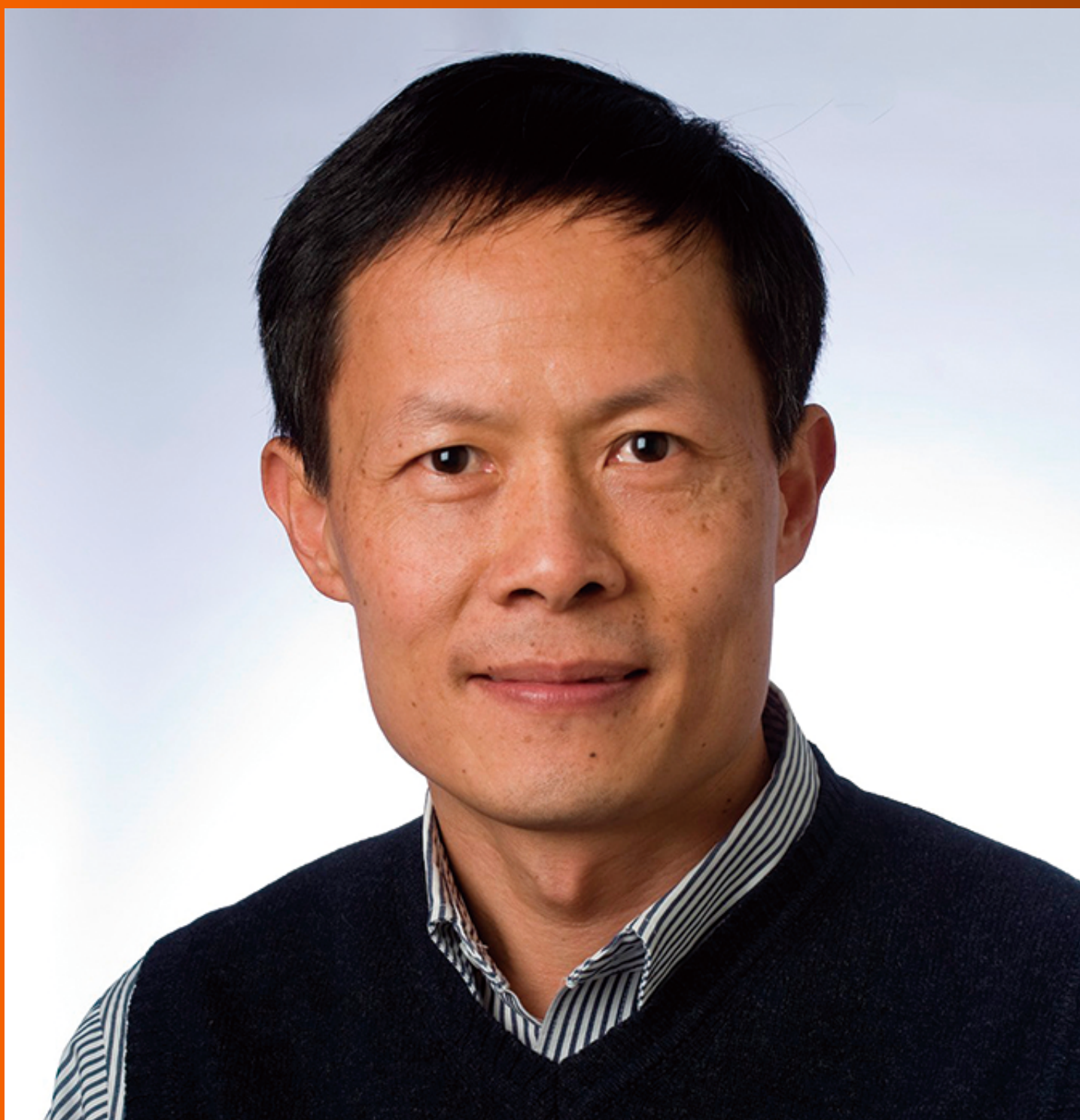


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## Diet and nutrition against inflammatory bowel disease: Trick or treat(ment)?

Salvatore Greco, Beatrice Bonsi, Nicolò Fabbri

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### Abstract

Even if the relationships between nutrition and inflammatory bowel disease (IBD) remain underexplored, the current literature is providing, day by day, much more evidence on the effects of various diets in both prevention and treatment of such illnesses. Wrong dietary habits, together with other environmental factors such as pollution, breastfeeding, smoke, and/or antibiotics, are among the theoretical pathogenetic causes of IBD, whose multifactorial aetiology has been already confirmed. While some of these risk factors are potentially reversible, some others cannot be avoided, and efficient treatments become necessary to prevent IBD spread or recurrence. Furthermore, the drugs currently available for treatment of such disease provide low-to-no effect against the symptoms, making the illnesses still strongly disabling. Whether nutrition and specific diets will prove to effectively interrupt the course of IBD has still to be clarified and, in this sense, further research concerning the applications of such dietary interventions is still needed.

**Key Words:** Crohn's disease; Ulcerative colitis; Inflammatory bowel disease; Diet; Nutrition; Treatment

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**Core Tip:** The incidence of inflammatory bowel disease (IBD) is alarmingly growing worldwide, and there is still no efficient drug able to induce complete remission since IBD spreads. There is currently no consensus in the medical community about nutritional treatment for the IBD patients, and the role of diet in the disease course is often underestimated. Diet and nutrition seem to have a role not only in preventing the onset of the disease, but also in inducing and keeping temporary remission. Whether specific diets have potential to cure the disease is still uncertain and much research is still needed to clarify their role in this sense. In our opinion, diet and nutrition should be classified as pure treatments against IBD, as it happens for steroids, azathiopirine, mesalazine, or others, and their administration should be indicated by nutrition specialists, with the greatest degree of customization of dosages and dietary plans.

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## TO THE EDITOR

Inflammatory bowel disease (IBD) is generally multifactorial and usually characterised by exacerbated immune response and epithelial barrier dysfunction. The intestinal epithelium is appointed to defend the host from bacterial and other micro-organisms' invasion and to control the passage of water and electrolytes. In the case of IBD, the integrity of the epithelial barrier gets severely compromised, with consequent destabilization of intercellular junctions (tight and adherens junctions)[1,2].

Pharmacological treatments include anti-inflammatory drugs, such as steroids, mesalazine, biological anti-tumor necrosis factor- $\alpha$ , or immunomodulators such as azathiopirine[3], but they are usually not sufficient to keep disease remission or show low-to-no effects against temporary symptoms. Moreover, the high incidence of side effects has to be considered. Substantially, there is still no efficient drug able to induce complete remission since IBD spreads. In this sense, the development of alternative and "safer" treatments for preventing the disease or controlling its course, has taken hold over the last decade. Diet itself, together with smoke, pollution, breastfeeding, and/or antibiotics, is among the most important environmental factors predisposing to IBD. The beneficial effect of diet on both development and duration of the remitting phases is already known, even if nutritional supplements and macro- and micro-nutrients should be always adapted to patients, as they have different roles in preventing or inducing remission in Crohn's disease (CD) or ulcerative colitis (UC)[4]. Furthermore, we would like to stress another aspect of the pathogenesis of such diseases, which is represented by intestinal dysbiosis (the altered composition of the gut microbiota), historically linked to numerous gastrointestinal diseases (including malignancies and chronic hepatitis B and often precipitated by the constant and increasing use of antibiotics in our society[5]. The current literature is full of examples of how intestinal dysbiosis can potentially affect the epithelial integrity, progressively leading to the development of chronic inflammatory diseases, but the exact mechanism of such damage is still far from being fully understood and deserves some more attention.

The gut microbiota of individuals with IBD is characterized by low microbial diversity in general, and a higher concentration of pathobionts such as adherent/invasive *Escherichia coli* and *Clostridium difficile*, Proteobacteria, and Actinobacteria, even if patients with CD have greater microbiota dysbiosis than those with UC[6-9].

Compared to the Mediterranean diet, the Western-style diet (WSD) contains significantly higher amounts of simple refined carbohydrates, saturated fat, red meat, dairy, and industrialized foods. Although the relationship between the WSD and IBD has only been partially studied, the WSD involves the use of nutrients capable of eliciting a direct or indirect pro-inflammatory effect on the intestine through alterations in the equilibrium among the immune system, microbiota, and intestinal barrier[10, 11].

Food-induced changes in the microbiota have not yet been fully studied, but it is known that higher intakes of fibers, while favouring the production of small chain fatty acids by the microbiota, can exacerbate the symptoms in patients with IBD, especially during the acute phases. Furthermore, the excess of refined carbohydrates and dairy products and proteins has been shown to alter the gut microbiota by reducing the abundance of bacteria such as *Roseburia* and *Eubacterium rectale*, where are considered beneficial to health due to their ability to produce butyrate[12-14]. However, the most compelling studies on IBD have focused on the risk of high-saturation polyunsaturated fatty acids as a consequence of high meat consumption (especially red meat).

Another possible causative factor is represented by gluten: Its digestion gives rise to toxic and antigenic peptides (especially alpha-gliadin peptides), which can interfere not only with the tight junctions between enterocytes but also with enterocyte survival by affecting the whole intestinal barrier.



High-fat diets, in general, can lead to higher storage of secondary bile acids, such as deoxycholic acid, which can inhibit the growth of specific bacterial phyla such as Bacteroidetes and Firmicutes, thus resulting in intestinal dysbiosis similar to that found in IBD[15]. Also, the negative effect of non-caloric artificial sweeteners on the composition and functioning of the microbiome has been clearly highlighted by several studies, resulting in an increased risk of obesity, insulin resistance, and inflammation[16,17].

Enteral nutrition (EN), either elemental or nonelemental, is considered a plausible alternative to drugs for inducing IBD remission, and it is able to fight the nutritional gap induced by intestinal malabsorption during the acute phase of the disease. EN has been shown to have an anti-inflammatory effect in children with CD, and it seems to have a significant impact in the cascade of pathogenesis, even if the underlying mechanisms of action are not fully understood[18-20]. Basically, although conducted on small sized samples of patients, most studies seem to suggest that IBD-dedicated diets should reduce the overall quantity of meat, eliminate red and processed meat, and eliminate or strongly reduce gluten and dairy products (*i.e.*, caseins), with the only exceptions of yogurt and kefir.

According to Levine *et al*[20] and after a quick review of the literature dedicated to this topic and with current knowledge, we can state that it is fundamental to customize the choice of micro- and macro-nutrients and supplemental nutrition for each patient; at the same time, it would be excessively superficial to consider the administration of such aids as tricks, only able to delay the spread of the IBD or the recurrence of their acute phases. In our opinion, diet and nutrition have to be classified as pure treatments against IBD, as it happens for steroids, azathiopirine, mesalazine, or others, and their administration should be indicated by nutrition specialists, with the greatest degree of customization of dosages and dietary plans.

## FOOTNOTES

**Author contributions:** Greco S and Fabbri N designed and performed the research; all authors analyzed the data and wrote the manuscript.

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