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Predictors of irritable bowel syndrome exacerbations and targeted therapeutic strategies: a narrative review

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Abstract

Background: Irritable bowel syndrome (IBS) is a chronic disorder, characterized by recurrent abdominal pain and disturbances in bowel habits. Also a low-FODMAP diet (LFD) is the first step in treatment, its universal application in all patients is not optimal; response rates range are from 50% to 80%.

Aim: Due to the highly heterogeneous nature of IBS, no definitive guidelines for treatment have yet been reached. We summarized the most important findings on this topic from the last decade. We identified specific predictors and then treatment strategies for specific patient groups.

Materials and Methods: A search of the PubMed and BASE databases (2016-2026) was conducted to identify full-text clinical studies and meta-analyses focusing on the relationship between IBS triggers, predictors of treatment response, and treatment results.

Results: The review identified various predictors across different domains. Important predictors of LFD success are: female gender, diagnosis confirmed by the Rome criteria, and clinical severity at baseline. From a microbiological perspective, high levels of Collinsella aerofaciens at baseline predict a positive response to specific probiotics. Bifidobacterium levels in the donor determine the success of fecal microbiota transplantation. Psychological aspects are also important; factors such as high anxiety related to symptom exacerbation, trust in the administered therapy, together with personality traits such as agreeableness, influence the effectiveness of behavioral therapies.

Conclusions: Treatment of IBS requires confirmation of the diagnosis (Rome criteria) and subsequent identification of individual predictive factors in order to implement individualized strategies including metabolic, microbiological and psychological profiling.

Keywords: *irritable bowel syndrome, predictors, FODMAP, therapy, IBS*

1. INTRODUCTION

Irritable bowel syndrome (IBS) is a chronic functional digestive disorder characterized by recurrent abdominal pain associated with bowel movements or changes in stool frequency and form. In the clinical course of this condition, an exacerbation—commonly referred to as a "flare"—represents a period of symptom intensification during which the core manifestations become severe and burdensome. The most common symptoms observed during such episodes include abdominal pain, increased stool frequency, watery diarrhea, and significant bloating.

The significant heterogeneity of this disorder dictates a multifaceted approach to the patient. It seems necessary to identify and assign a factor that influences their disease. This requires an appropriate therapeutic approach that matches the predictor described earlier. Some such predictors include metabolic and microbiological disorders, as well as psychological stressors. A correct diagnosis of IBS and the exclusion of conditions with a similar clinical picture are essential. For this purpose, the Rome criteria are used. An example of a condition similar to the disorder discussed is bile acid malabsorption syndrome (BAM), which mimics the symptoms of IBS. However, it requires a fundamentally different therapeutic approach, so it seems important to separate such patients from the group suffering from IBS [17].

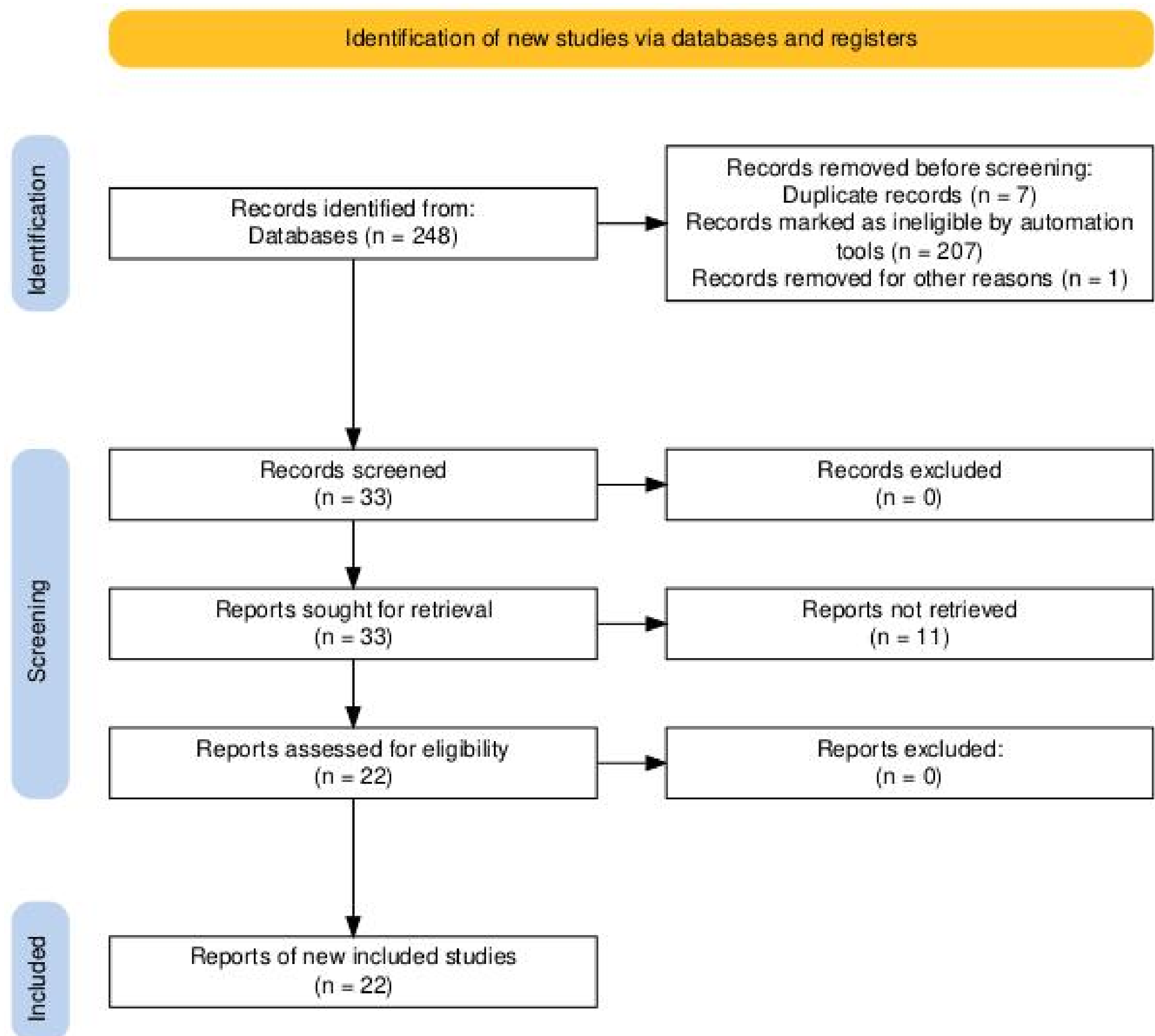
Currently, the first-line treatment recommendation for IBS is a low-FODMAP diet (LFD). However, this diet is not optimal for every patient. Only 50–80% of patients respond positively to LFD; the rest, unfortunately, will not benefit from these relatively severe dietary restrictions [18,20,23]. Moreover, treatment with LFD, in some groups of patients, may worsen food-related anxiety and lead to avoidant/restrictive food intake disorder (ARFID) in up to 50% of patients [18,20].

It is therefore important to consider whether there are identifiable factors that could guide a more individualized therapeutic approach for individual patients. Accordingly, the identification of biological, psychological, and clinical predictors—such as baseline Collinsella levels or specific anxiety profiles—is imperative for carefully determining etiology and properly treating IBS exacerbations [12,19]. Through such a customized

approach, patients receive the most appropriate intervention designed for their individual profile, ultimately resulting in improved long-term clinical outcomes and general health.

2. MATERIALS AND METHODS

The study is a narrative review in which we aim to collect available methods of treatment and prevention of exacerbations of irritable bowel syndrome. In the study, we used the online databases PubMed and BASE (Bielefeld Academic Search Engine). The search covered the period from January 2016 to March 2026. During the search, we focused on identifying studies concerning irritable bowel syndrome in which researchers examined the relationship between the cause of exacerbations of irritable bowel syndrome and appropriately selected therapy, as well as the outcomes of the applied therapy. The keywords used during the search included, among others, “irritable bowel syndrome”, “predictors”, “therapy”, “IBS” and “FODMAP”. The inclusion criteria were as follows: only full-text articles, in English, conducted on humans. The types of studies we considered were meta-analyses and original clinical studies. Exclusion criteria comprised: case reports, studies conducted on animals, not in English, and whose main topic was not IBS. First, we applied automatic filtering methods available in the databases we used, and then we manually searched for articles that met our specified criteria. We also took into account the possibility of duplicate records across databases and excluded duplicates. The process of article selection was presented in a PRISMA diagram (Figure 1).



Source: https://www.prisma-statement.org/prisma-2020-flow-diagram

Figure 1. (PRISMA flow diagram)

3. RESULTS AND DISCUSSION

In the studies we found (selected based on the rules presented earlier), we managed to distinguish the most important categories which we then considered: diet, psychological aspects, gut microbiota, and others.

3.1 Effectiveness of dietary interventions

The current first-line therapy for irritable bowel syndrome is the relatively restrictive low-FODMAP diet (LFD). Adherence to an LFD does not always lead to clinical improvement in all patients. This is the major drawback of this recommendation, as measured response rates range from approximately 50% to 80% [18,20]. The DOMINO study, the largest clinical trial in the analyzed dataset (n = 459), demonstrated that treatment of IBS using a low-FODMAP diet achieved a responder rate of 71%. In comparison, standard therapy with antispasmodic medication (otilonium bromide) resulted in a 61% response rate, supporting the notion that dietary therapy should be used as the first-line approach. Interestingly, better outcomes with the low-FODMAP diet were observed in patients whose diagnosis was confirmed using the Rome criteria [16]. There are also reports suggesting that "hybrid" diets may be even more effective. For instance, combining a low-FODMAP diet with a Mediterranean diet (Med-LFD) resulted in a significant clinical response in patients with IBS without constipation. The hybrid diet was found to be the strongest independent predictor of clinical improvement. The MED-LFD resulted in a positive treatment response more than six times more often than the control group (OR = 6.66; 95% CI: 1.46–30.4). Researchers have linked this effect to the anti-inflammatory properties of the Mediterranean diet [4]. In another comparison, improvement in patient health was observed following the implementation of a gluten-free diet. The patients were divided into two groups: the control group followed a low-FODMAP diet, and the study group followed a gluten-free diet. It is unclear whether the improvement is due to the elimination of gluten itself or to a dietary reduction in FODMAP intake secondary to the exclusion of wheat-based products [7].

A major challenge in the treatment of IBS is identifying the patient group that will benefit from a low-FODMAP diet. This diet is quite difficult to implement, so research is currently underway to identify predictors of response to the low-FODFD. Previous reports, for example, indicate that female gender is one of the predictors of a better response [3,16,20]. Furthermore, patients diagnosed according to the Rome criteria are more likely to achieve treatment success, with a positive response rate of 77% [16]. Baseline symptom severity also represents an important predictive factor. The low-FODMAP diet gives the greatest relief to patients with abdominal pain or bloating [1,3]. Unfortunately, there are conflicting reports in the scientific literature regarding the IBS subtype (e.g., IBS-D, IBS-C, or IBS-M). Patients with diarrhea symptoms (IBS-D subtype) typically experience improvement in their well-being through

reduced abdominal pain and improved stool consistency [16]. Reports from another study disagree. In this study, no association was found between the subtype and the response to LFD treatment [8].

Prediction of exacerbations and treatment efficacy is increasingly moving toward "precision medicine." This approach consists of identifying laboratory-based biomarkers that can predict the effectiveness of dietary interventions in individual patients. Research indicates that a high number of Prevotella bacteria in the gut microbiota is a strong biological predictor of a positive response to LFD. [8,20]. Additionally, LFD has been shown to be highly effective in patients with specific fecal volatile organic compound profiles [4]. On the other hand, currently used tests appear less useful; for example, genetic markers of celiac disease (HLA-DQ2/8) or anti-gliadin antibodies do not accurately predict the response of IBS patients to a gluten-free diet [7]. Similarly, standard hydrogen breath tests are increasingly considered unreliable in predicting the long-term impact of a low-FODMAP diet [20,21].

The body's response to dietary changes is closely linked to the gut-brain axis. Greater pain reduction is experienced by patients who experience lower disease-related anxiety at the beginning of treatment [3]. At the same time, restrictive diets such as LFD can exacerbate anxiety associated with disease flares and ultimately lead to avoidant/restrictive food intake disorder (ARFID) in up to 50% of patients [18,20]. For these reasons, the patient's psychological profile should be considered. It is important to determine whether a restrictive diet is appropriate for the patient or whether exposure-based therapies should be the first choice [18].

Current recommendations acknowledge the problem of the high restrictiveness of LFD. Therefore, a model of long-term dietary restrictions is being abandoned in favor of a more individualized approach. A three-phase approach is currently used to determine the individual's tolerance threshold for FODMAP-containing products. Elimination of FODMAP products, sequential reintroduction of these products into the diet, and personalization [18,21]. Digital strategies, such as dedicated smartphone apps, are helping patients navigate this difficult period. These apps make it easier for patients to adhere to dietary recommendations [16]. (Table 1).

Author	Year	No. of patients (N)	Predictors	Main findings
Carbone et al. „DOMINO”	2021	459	Low FODMAP vs otilonium bromide intake	The diet proved more effective in relieving IBS symptoms than standard pharmacological treatment. 71% of respondents on the LFD vs. 61% on the antispasmodic medication.
Colomier et al.	2022	190	Low FODMAP vs traditional dietary advice (TDA)	Predictors for specific symptoms were identified; higher pain and lower anxiety levels favored response.
Zhang et al.	2021	108	Low FODMAP vs TDA	68% of respondents on LFD vs 41% on TDA.
Kasti et al.	2025	100	Mediterranean version of the low-FODMAP Diet vs. NICE guidelines for IBS	90% effectiveness of the Mediterranean diet Med-LFD vs 36% in the control group.

Author	Year	No. of patients (N)	Predictors	Main findings
Algera et al. (1)	2022	29	low vs. moderate FODMAP	The LFD diet (4g/d) was significantly better than the moderate FODMAP diet (23g/d) in reducing symptoms measured by the IBS-SSS scale.
Algera et al. (2)	2022	42	Low FODMAP with gluten vs low FODMAP without gluten	The gluten-free diet (GFD) reduces IBS-SSS by 58 points. The benefits of a gluten-free diet in IBS may largely result from the simultaneous reduction of fructans, rather than just the elimination of gluten itself.
Manning et al.	2025	N/A	Low FODMAP	Up to 50% of patients may not respond to the diet, citing anxiety and depression as barriers. The patient's clinical profile and psychological risk assessment remain the most important tools in targeted IBS therapy.
Biesiekierski et al.	2023	N/A	Low FODMAP, CBT	The effectiveness of LFD is estimated at 50–80%; it highlights the risk of eating disorders (ARFID) – an important role for CBT therapy.
Molina-	2016	N/A	Low	70% effectiveness of LFD in

Author	Year	No. of patients (N)	Predictors	Main findings
Infante et al.			FODMAP	prospective studies; The most responsive symptoms to the diet are bloating, gas, abdominal pain and urgency.

Source: A table prepared especially for the review purposes

Table 1.

3.2 Psychological aspects of irritable bowel syndrome (IBS) treatment

The analyzed studies show that irritable bowel syndrome (IBS) should be understood within the biopsychosocial model as a disorder of gut–brain interaction. The results show that psychological aspects are not simply a secondary response to physical pain, but strongly predict and determine the patient's response to both medical and psychological treatment. The data suggest that patients with a higher psychological burden frequently derive the greatest benefit from targeted psychological interventions. For example, patients presenting with high levels of somatization, as well as comorbid anxiety or depression, showed a significantly better response to cognitive behavioral therapy (CBT) compared to standard medical education [10]. A strong predictors of psychotherapy success in IBS are: greater baseline symptom severity and comorbid mental disorders [19]. Unfortunately, certain cognitive and personality traits may obstruct recovery. Patients with high levels of alexithymia, defined as an inability to identify and express emotions, exhibited a significantly poorer response to standard gastroenterological care [5]. Moreover, patients who believe that their illness has an exclusively physical origin or who tend to catastrophize their symptoms generally achieve worse outcomes in standard cognitive behavioral therapy (CBT) [15]. In terms of the effectiveness of psychological treatment in IBS, improvement in physical condition is typically driven by specific changes in the patient's thinking patterns and behavior. According to researchers, the most important factor leading to symptom reduction is the decrease in gastrointestinal-specific anxiety (GSA). When patients no longer fear their symptoms (e.g.,

fear of having to use the restroom in a public place), their actual physical discomfort decreases [2]. Reducing visceral anxiety and avoidance behaviors leads to improved patient functioning. Face-to-face group therapy has been shown to be highly effective in this regard [14]. In recovery, it is important to cease avoidance behaviors; in these patients, exposure-based therapies are highly effective [9]. The patient's mental state also influences healthcare utilization. The actual severity of gastrointestinal symptoms has been observed to have a smaller impact on the frequency of medical visits than high levels of patient stress and low perceived control over symptoms [22]. Studies also show that patients with high agreeableness and positive treatment expectations respond better to placebo [6]. Psychological factors, particularly elevated levels of anxiety and depression, serve as significant predictors of symptom severity and frequent exacerbations in patients with Irritable Bowel Syndrome, reinforcing the clinical necessity for integrated gastrointestinal and psychiatric care. [25]

The results show that modern IBS management must incorporate psychological assessment, which includes, among others: alexithymia, catastrophizing, and gastrointestinal-specific anxiety, enabling clinicians to personalize treatment, refer patients to appropriate behavioral therapies, and ultimately achieve better clinical outcomes (Table 2).

Author	Year	No. of patients (N)	Main findings
Rometsch et al.	2025	3382	High baseline symptom severity, depression and anxiety are strong predictors of treatment success in functional disorders.
Radu et al.	2018	638	Reducing specific anxiety (GSA) and changing beliefs about the disease are key mechanisms of physical improvement.
Sarter et al.	2021	3145	Catastrophizing and the belief in a solely physical cause of illness correlate with poorer CBT outcomes.

Author	Year	No. of patients (N)	Main findings
Lackner & Jaccard	2019	436	Patients with high somatization and psychiatric comorbidity have a 22-26% greater chance of success with CBT than with education.
Wallén et al.	2022	114	A very large reduction in visceral anxiety (VSI) was demonstrated with an effect size of d = 1.12.
Porcelli et al.	2017	150	Alexithymia is a strong negative predictor of improvement (d = 1.27). GSA correlates with symptom severity.
Hesser et al.	2021	309	Avoidance moderates the effects of therapy; individuals with high avoidance benefit most from exposure techniques.
Ballou et al.	2022	112	Higher agreeableness (personality) and low anxiety (VSI) predict better response to open-label placebo (OLP).
Gudleski et al.	2017	436	The frequency of medical visits depends on distress and stress (PSS) and not on the objective severity of pain.

Source: A table prepared especially for the review purposes

Table 2.

3.3 Gut microbiota as a predictor of targeted therapy

The analyzed studies suggest that the gut microbiota profile may serve as a precise biomarker for predicting patient response to specific probiotic strains. They indicate that the baseline abundance of certain bacteria is a key predictive factor for clinical success. For example, a probiotic containing the Lacticaseibacillus paracasei DG (LDG), was more likely to have a

positive effect when administered to patients with high Collinsella aerofaciens counts [12]. In this study, 25% of patients in the probiotic group were classified as responders. LDG treatment effectively improved the gut microbiota, suggesting that the presence of C. aerofaciens may be a good predictor of response to LDG (PV-1 protein is positively correlated with the presence of C. aerofaciens) [12]. While the success of probiotic therapy depends on the patient's existing microbiota, the effectiveness of fecal microbiota transplantation (FMT) depends on the microbiological "richness" of the donor. Clinical data indicate that a fecal donor rich in Bifidobacterium is a strong positive predictor of transplant success in patients with irritable bowel syndrome (IBS) [13]. In a pilot study, 60% of patients (6 out of 10) who received FMT from donors with high levels of Bifidobacterium were classified as responders, manifesting a significant reduction in symptom severity (IBS-SSS) and improvement in psychological distress. This evidence indicates that screening of FMT donors is an essential strategy to increase the likelihood of clinical success [13]. Recent advances in understanding the gut-brain axis and microbiota composition have paved the way for targeted therapies in IBS, including fecal microbiota transplantation (FMT) [24].

As previously mentioned, many promising prognostic factors in the gut microbiome have been identified. Among the most important are the verification of Collinsella aerofaciens levels to predict probiotic response and the verification of FMT donors for high Bifidobacterium levels [12,13] (Table 3).

Author	Year	No. of patients (N)	Main findings
Gargari et al.	2024	N/A (Subpopulation of 221 people)	High baseline levels of C. aerofaciens predict treatment success with the probiotic LDG. Twenty-five percent of patients achieved a clinical response. The bacteria have been shown to be associated with intestinal barrier disruption (PV-1 protein).
Mizuno et al.	2017	10	FMT was 60% effective. A key predictor of success was a rich Bifidobacterium profile in the stool donor. Respondents reported a decrease in

Author	Year	No. of patients (N)	Main findings
			anxiety and depression (HADS scale).

Source: A table prepared especially for the review purposes

Table 3.

3.4 Post-infectious triggers and differential diagnosis: COVID-19 and bile acid malabsorption

Functional disorders associated with COVID-19 infection, or PTSD associated with COVID?

A multicenter observational study was conducted to explore the relationship between COVID-19 and gut-brain axis disorders. Approximately 12–18 months after hospitalization for COVID-19, 60.3% of patients met diagnostic criteria for at least one functional bowel disorder, including IBS [11]. Although 42.1% of patients with acute gastrointestinal symptoms during infection experienced lasting problems, the most significant prognostic factor for the severity of gastrointestinal symptoms was not the infection itself, but psychological trauma. Severe and long-lasting IBS exacerbations were found in patients struggling with clinical post-traumatic stress disorder (PTSD was found in 41.4% of the study participants), and the studies conducted showed a high level of correlation in this regard [11]. This only confirms the previous conclusions about the high correlation between psychological aspects and the severity of IBS symptoms and that the finding of such a problem in a patient should prompt him to seek psychological help.

IBS-D could possibly be a bad diagnosis for bile acid malabsorption (BAM).

An important challenge in the management of refractory IBS-D is its clinical overlap with bile acid malabsorption (BAM). In a large-scale retrospective analysis of 420 patients, 46% (n = 192) were diagnosed with BAM using the gold-standard 75SeHCAT scintigraphy [17]. Among patients who met formal Rome IV criteria for IBS-D or functional diarrhea, 38% were found to have coexisting BAM, suggesting that a substantial proportion of “treatment-resistant IBS” cases may be misdiagnosed.

BAM is more common in certain patient groups: cholecystectomy was associated with a 77% positive outcome rate in symptomatic patients, ileal resection (especially >15 cm) resulted in

BAM in 94% of cases [17]. Proper history taking and identification of surgical history are important for diagnosing/excluding BAM. Targeted therapy with bile acid sequestrants (BAS) resulted in a successful clinical response in 76% of patients with BAM, effectively relieving symptoms previously attributed to functional bowel disorders [17].

This evidence shows that excluding BAM in patients with chronic watery diarrhea is an important targeted strategy that helps avoid diagnostic stagnation and ensures therapeutic success. (Table 4.)

Author	Year	No. of patients (N)	Main findings
Vulsteke et al.	2024	420	38% of people diagnosed with IBS-D actually have BAM. Predictors: cholecystectomy and ileal resection. Effectiveness of targeted therapy (BAS): 76%.
Elmunzer et al.	2024	116	60.3% of people develop DGBI after hospitalization. The strongest predictor of chronic IBS symptoms is PTSD (present in 41.4% of respondents), not the course of the infection itself.

Source: A table prepared especially for the review purposes

Table 4.

4. CONCLUSION:

Modern approaches to the treatment of irritable bowel syndrome (IBS) are evolving towards a model of individualized medicine. The crux lies in searching for measurable triggers of exacerbations, which enables the individualization of therapy.

First, it is necessary to assign patients to a group that is likely to benefit from the low-FODMAP diet (LFD). Researchers most often point out that predictors of dietary success include female sex, confirmation of diagnosis based on the Rome criteria, and significant baseline symptom severity. The quantitative determination of the Prevotella species in the gut

microbiome and the analysis of fecal volatilomic profiles also allow for assignment to the appropriate group. An interesting solution leading to good dietary treatment outcomes is the use of a hybrid diet, combining low-FODMAP with a Mediterranean diet.

Second, the patient's psychological burden actively determines the response to treatment. High levels of somatization, anxiety, and coexisting depression are strong predictors of success in targeted cognitive-behavioral therapy (CBT), while patients with alexithymia or a tendency toward catastrophizing usually have a poorer prognosis. The therapeutic goal in CBT is the identification and reduction of gastrointestinal-specific anxiety (GSA), as well as the elimination of avoidance behaviors through exposure-based techniques.

Third, it has been shown that high baseline abundance of the pathobiont Collinsella aerofaciens correlates with a positive response to supplementation with the Lacticaseibacillus paracasei strain. The gut microbiota profile, therefore, serves as a biomarker supporting targeted selection of probiotic therapy. In the context of identifying suitable fecal donors for transplantation, the most important prognostic factor is the donor's taxonomic richness in Bifidobacterium bacteria.

Particular attention should be paid to differential diagnosis. Identifying patients with a misdiagnosis of IBS continues to be a major challenge. Bile acid malabsorption (BAM) may affect nearly 38% of patients with treatment-resistant, diarrhea-predominant IBS. Diagnosing BAM allows for the implementation of effective treatment with bile acid sequestrants.

Research gaps and future directions

A necessary direction for research is the further deepening of knowledge regarding the pathophysiology of IBS. This will most likely allow for the development of new drugs with a specific target and, consequently, the implementation of individualized medicine. We hope that future studies will allow for a better understanding of this multifactorial disease.

Disclosure

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