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# The pathophysiology, diagnosis, and treatment of IBS

A thorough history and examination, with appropriate testing, are vital to establish rapport with the patient, identify any comorbid conditions, and exclude organic causes of symptoms.

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Irritable bowel syndrome (IBS) is a functional bowel disorder characterized by altered bowel habits and chronic abdominal pain. Population-based studies estimate its prevalence at between 10% and 15%, with a female-to-male predominance of 2:1 and an initial presentation at between 30 and 50 years old.<sup>1</sup> The most commonly diagnosed GI disorder, IBS constitutes 25% to 50% of referrals to gastroenterologists. Even though only 15% of those affected seek medical attention, IBS has significant economic and social effects; it is the second leading cause of work absenteeism in the United States, after the common cold, and was estimated to cost \$1.7 billion in 2000.<sup>2</sup> Total health care expenditures

for patients with IBS are noted to be 49% higher than those for control populations, with the majority of excess health care costs attributable to medical care unrelated to lower GI problems.<sup>3</sup>


Although 10% to 15% of Americans report symptoms of IBS, providers often feel ill-equipped to deal with these patients.<sup>4</sup> Limited knowledge of the syndrome's pathophysiology and a lack of effective treatment options leave both clinicians and patients frustrated. PAs need the tools to better assess, diagnose, and treat patients with IBS.

## Pathophysiology

The etiology of IBS remains unclear. Several studies show that affected persons have abnormal GI motility in response to a number of stimuli, including meals, distention, stress, and certain chemicals; however, no one predominant pattern of motor activity has emerged as a marker.<sup>5</sup>

Visceral hypersensitivity has also been reported. While 50% to 70% of patients with IBS have visceral pain thresholds below the normal range, they show normal—in some studies, elevated—somatic pain thresholds.<sup>6</sup> It remains unclear whether visceral hyperalgesia is mediated by the CNS, local GI innervation, or a combination of the two.

**Nervous system dysfunction** Many experts argue that IBS is due to a neuralgic dysfunction of the gut and



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### Learning objectives

- Understand the leading theories regarding the pathophysiology of IBS
- Recognize alarm symptoms and signs inconsistent with IBS
- Describe how to cost-effectively diagnose IBS
- Appropriately treat IBS based on the individual presentation

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a breakdown in the interaction between the GI tract and the brain. Bidirectional communication between the CNS and the gut is essential in both health and disease. The autonomic nervous system communicates emotional changes to the gut, while the CNS is involved in the perception of events in the gut. A dysfunction in this communication may contribute to the dysfunction seen in IBS. Studies using positron emission tomography and functional MRI show abnormal CNS processing of noxious visceral stimuli.<sup>4,7</sup> Potential markers include serotonin, calcitonin gene-related peptide, substance P, bradykinin, tachykinins, and neurotrophins.<sup>2,8</sup> A number of the new medications marketed for IBS target serotonin. This neurotransmitter plays a role in the stimulation of intestinal secretion, peristalsis, and the function of visceral pain receptors through the 5-hydroxytryptamine<sub>3</sub> (5-HT<sub>3</sub>) and 5-HT<sub>4</sub> pathways.<sup>9</sup>

**Role of the psyche** The dysregulation of the brain-gut axis may also help explain the role of psychosocial factors and the high rate of psychiatric comorbidity in persons with IBS. Clinical observations show that patients often suffer exacerbations during times of elevated stress. Furthermore, patients with IBS who do not seek medical attention are psychologically indistinguishable from healthy controls; however, those who do seek care exhibit increased anxiety, depression, phobias, and somatization.<sup>10</sup> Patients who seek care are also more likely to have a history of physical or sexual abuse.<sup>11</sup> Recent studies suggest that corticotrophin-releasing factor (CRF) may play a role. In a normal GI tract, reaction to stress may be mediated by CRF, a peptide released from the paraventricular nucleus. The overactivity of brain CRF and the CRF-receptor signaling system contributes to anxiety disorders and depression. In patients with IBS, IV administration of CRF increases abdominal pain and colonic motility to a higher degree than in normal controls.<sup>12</sup>

Other theories include microscopic inflammation, small bowel bacterial overgrowth, and a postinfectious etiology. There is a 20% to 30% incidence of persistent IBS symptoms 1 year after bacterial gastroenteritis.<sup>13</sup> Heredity may also play a role, but the relationship between genetic factors and learned behavior is still unclear.

## Diagnosis

Because IBS is a functional disorder for which no specific diagnostic test exists, many providers view it as a diagnosis of exclusion. The American College of Gastroenterology and the American Gastroenterological Association (AGA) encourage a cost-effective approach with a limited work-up for patients without alarm features.

**Differential diagnosis** In the workup of patients with possible IBS, conditions such as inflammatory bowel disease, infection, celiac sprue, adenocarcinoma

## IN THIS ARTICLE

### Key Points

- The most commonly diagnosed GI disorder, IBS constitutes 25% to 50% of GI referrals.
- While many providers view IBS as a diagnosis of exclusion, the American Gastroenterological Association recommends a limited, cost-effective work-up in those without alarm symptoms.
- A broad differential diagnosis is essential when evaluating a patient with suspected IBS.
- Treatment decisions should be made based on the character and severity of symptoms along with the presence of comorbidities.

### Competencies

Medical knowledge	◆◆◆◆◆
Interpersonal & communication skills	◆◆◆◆
Patient care	◆◆◆◆
Professionalism	◆
Practice-based learning and improvement	◆
Systems-based practice	◆

For an explanation of competencies ratings, see the table of contents.

of the colon, and lactose intolerance must be considered, as must various non-GI diseases and functional disorders<sup>14</sup> (see Table 1, page 18). Symptom details such as volume, frequency, and consistency of stool are important. Commonly seen upper GI symptoms that are associated with IBS include reflux, dysphagia, early satiety, intermittent dyspepsia, nausea, and noncardiac chest pain.<sup>15</sup> Patients also commonly complain of a wide variety of extraintestinal symptoms, including bronchospasm, dysmenorrhea, dyspareunia, polyuria, and low back pain. They are also more likely to suffer from fibromyalgia, temporomandibular disorder, and chronic pelvic pain, and they are three times as likely to undergo hysterectomy and other surgical procedures.<sup>16,17</sup> Be alert to symptoms that are not consistent with IBS, such as anorexia, malnutrition, weight loss, or pain that is progressive and affects sleep<sup>16,18</sup> (see Table 2, page 18). Other important aspects of the history include medications and social, family, travel, and dietary histories.

The clinical manifestations of IBS vary widely. Patient subgroups are described as constipation-predominant, diarrhea-predominant, and pain-predominant. While classifying patients into subgroups may be helpful for directing treatment, many patients have fluctuating symptoms or do not classically fit into one of the three groups. IBS is best characterized by changes in bowel

TABLE 1

## Differential diagnosis of IBS

GI disorders	
<ul style="list-style-type: none"> <li>• Adenocarcinoma of the colon</li> <li>• Celiac sprue</li> <li>• Diverticula</li> <li>• Infectious diseases</li> <li>• Inflammatory bowel disease</li> </ul>	<ul style="list-style-type: none"> <li>• Lactose intolerance</li> <li>• Pancreatic insufficiency</li> <li>• Radiation damage</li> <li>• Villous adenoma</li> </ul>
Non-GI causes	
<ul style="list-style-type: none"> <li>• Depression</li> <li>• Diabetes mellitus</li> <li>• Endocrine tumors</li> <li>• Gynecologic disorders</li> <li>• Laxative use</li> </ul>	<ul style="list-style-type: none"> <li>• Medication side effects</li> <li>• Scleroderma</li> <li>• Somatization</li> <li>• Thyroid dysfunction</li> </ul>
Other functional disorders	
<ul style="list-style-type: none"> <li>• Anorectal dysfunction syndrome</li> <li>• Functional bloating</li> <li>• Functional constipation</li> </ul>	<ul style="list-style-type: none"> <li>• Functional diarrhea</li> <li>• Functional dyspepsia</li> <li>• Pelvic floor disorders</li> </ul>

Data from Holten KB et al.<sup>14</sup>

TABLE 2

## Alarm symptoms in evaluating for IBS

<ul style="list-style-type: none"> <li>• Abnormal blood studies</li> <li>• Anemia</li> <li>• Anorexia</li> <li>• Blood in stools</li> <li>• Family history of colon cancer or inflammatory bowel disease</li> <li>• Fever</li> <li>• Malnutrition</li> </ul>	<ul style="list-style-type: none"> <li>• Nocturnal symptoms</li> <li>• Onset in patients &gt;50 y</li> <li>• Palpable abdominal or rectal mass</li> <li>• Persistent diarrhea or severe constipation</li> <li>• Recent antibiotic use</li> <li>• Rectal bleeding</li> <li>• Weight loss (&gt;10 lb)</li> </ul>
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Data from Paterson WG et al,<sup>16</sup> and Thompson WG et al.<sup>18</sup>

movement frequency or appearance and abdominal pain that is relieved by defecation. Some patients report bloating, distention, urgency, a feeling of incomplete evacuation, and the presence of mucus in the stool.<sup>14</sup>

**Physical examination** A detailed physical examination serves to screen for findings inconsistent with IBS and to provide reassurance that the patient's concerns are being seriously considered. The abdominal examination may reveal mild diffuse or left lower quadrant tenderness, but findings such as organomegaly, a mass, or ascites are inconsistent with the diagnosis. In women, a

pelvic examination is often indicated, and for patients with complaints of incontinence or dyschezia, a rectal examination can help identify a lax sphincter or paradoxical pelvic floor muscle contraction.

**Diagnostic criteria** To standardize the diagnosis of IBS based on positive symptoms, the Manning criteria were formulated in 1978.<sup>19</sup> In 1992, in an effort to standardize clinical research protocols, an international working team designed the Rome criteria, which were revised in 1999 and again in 2006<sup>18</sup> (see Table 3). The AGA recommends a diagnosis based on identifying positive symptoms with the Rome criteria and excluding, in a cost-effective manner, other conditions with similar presentations.<sup>20</sup> In the absence of alarm features, the specificity of the Rome I criteria for IBS is greater than 98%.<sup>21</sup>

**Laboratory testing** The history and physical examination allow the practitioner to glean information useful in determining the need for further studies. The AGA recommends a routine CBC and fecal occult blood testing. If alarm symptoms are present, a full workup and referral to a gastroenterologist are warranted.<sup>14</sup> If there are no alarm symptoms and the Rome criteria are met, the patient may be evaluated based on age. Those older than 50 years should be referred to a gastroenterologist for a colonoscopy; those younger than 50 years may be evaluated based on their predominant symptom. Further tests may include a chemistry panel, ESR, thyroid-stimulating hormone level, stool analysis for ova and parasites, and tests for antiendomysial and antigliadin antibodies.<sup>20</sup> Additional testing may be indicated but is more often performed after referral to a gastroenterologist.

### Treatment

Once the diagnosis of IBS has been made, the treatment plan is based on the nature and severity of the symptoms, the degree of functional impairment, and the presence of psychosocial factors. A therapeutic relationship is essential for effective management and decreases the number of follow-up visits.<sup>21</sup> The provider must be nonjudgmental, give a thorough explanation of the disorder and its chronicity, provide reassurance that IBS is not dangerous or life threatening, and involve the patient in the treatment plan.<sup>22</sup> Despite the benign nature of IBS, studies show that it significantly affects quality of life; therefore, providers must actively listen and communicate understanding and compassion to these patients.

**Diet** While patients are more likely to have generalized postprandial symptoms than reactions to specific types of food, symptom diaries can sometimes identify social and dietary triggers. Problematic dietary substances often include coffee, alcohol, carbonated drinks, disaccharides, beans, and leafy vegetables.<sup>20</sup>

Increased fiber intake has long been recommended for treatment of IBS, but studies are not conclusive as to its benefit. Fiber is thought to increase stool bulk, to bind to agents such as bile, to enhance the stool's water-holding properties, and to promote gel formation to provide lubrication.<sup>23</sup> Safety and low cost make a trial of fiber, 20 to 25 g daily, either dietary or in supplements, reasonable in all patients.<sup>24</sup> The dosage may require titration over several weeks to reduce abdominal pain and bloating.

For patients with mild symptoms, reassurance and education may be sufficient, but those with moderate to severe symptoms may require pharmacologic therapy (see Table 4, page 20). This decision is based on the predominant symptom and presence of comorbid psychiatric conditions.

**Medication** Antispasmodic agents relax smooth muscle in the gut and reduce propulsive contractions, decreasing postprandial abdominal pain, gas, bloating, and fecal urgency.<sup>21,23,25</sup> Dicyclomine, hyoscyamine, and clidinium bromide/chlordiazepoxide work through anticholinergic or antimuscarinic properties and may be used in an as-needed or in an anticipatory fashion.<sup>25,26</sup> Higher dosages are more effective, but anticholinergic side effects may be a limiting factor.

At low dosages, tricyclic antidepressants (TCAs) and, potentially, selective serotonin reuptake inhibitors (SSRIs) have analgesic properties independent of their effect on mood.<sup>26,27</sup> The proposed mechanism is a facilitation of endogenous endorphin release and blockade of norepinephrine reuptake, which leads to an enhancement of descending inhibitory pain pathways and blockade of the pain neuromodulator serotonin.<sup>28</sup> Additionally, the anticholinergic properties of TCAs may slow intestinal transit time, making them effective in the treatment of diarrhea. Studies have shown improvement in global symptoms, abdominal pain, and diarrhea in patients taking low-dose TCAs. One in three patients treated with TCAs experiences an improvement in symptoms.<sup>29</sup> TCAs such as amitriptyline, nortriptyline, imipramine, and desipramine should be started at lower dosages than those used for treatment of depression, and then they should be slowly titrated until pain control or tolerance is achieved. Allow 3 to 4 weeks before reassessment.<sup>26</sup> TCAs should be used with caution in the elderly and in patients with constipation, conduction abnormalities, and impaired ventricular function. SSRIs such as paroxetine, fluoxetine, and sertraline may also be beneficial, but supporting studies are limited and these agents are currently recommended only for patients with concomitant depression or anxiety.<sup>30,31</sup> Because of the high rate of coexisting anxiety and its role in IBS exacerbations, benzodiazepines are sometimes prescribed. Their use should be limited, however, because of the risks of drug interactions, habituation, and rebound withdrawal.<sup>26,30</sup>

A systematic review found that loperamide improved diarrhea symptoms in patients with IBS; in some small studies, it was found to improve global symptoms.<sup>26,30</sup> This agent is an opioid that does not cross the blood-brain barrier and works to slow intestinal transit and increase both intestinal water absorption and resting sphincter tone.<sup>24</sup>

Alosetron is a 5-HT<sub>3</sub> receptor antagonist that has been shown to alleviate abdominal pain and improve quality of life in women with diarrhea-predominant IBS.<sup>32</sup> Due to risks of ischemic colitis and serious complications related to constipation, the FDA removed it from the market in 2000. Currently, its use is restricted to those in whom traditional treatments have failed and whose providers are enrolled in the prescribing program for alosetron.<sup>24,26,30</sup>

Tegaserod, a partial 5-HT<sub>4</sub> receptor agonist, is approved by the FDA for those with constipation-predominant IBS. It stimulates the release of neurotrans-

**TABLE 3**  
**Diagnostic criteria for IBS**

**Manning criteria**

- Pain relieved with defecation
- More frequent stools at the onset of pain
- Looser stools at the onset of pain
- Visible abdominal distention
- Passage of mucus
- Sensation of incomplete evacuation

The likelihood of IBS is proportional to the number of criteria that are present.

**Rome criteria**

Continuous or recurrent abdominal pain or discomfort that persists  $\geq 12$  wk, has its onset at least 6 mo prior to diagnosis, and includes at least two of the following:

- Improvement with defecation
- Onset associated with change in frequency of stool
- Onset associated with change in form (appearance) of stool

Symptoms that cumulatively support the diagnosis of IBS:

- Abnormal stool frequency (for research, this is defined as  $>3$  bowel movements/d or  $\leq 3$ /wk)
- Abnormal stool form (lumpy/hard or loose/watery)
- Abnormal stool passage (straining, urgency, or feeling of incomplete evacuation)
- Passage of mucus
- Bloating or feeling of abdominal distention

Data from Thompson WG et al,<sup>18</sup> and Longstreth GF, Thompson G, Chey WD, et al. Functional bowel disorders. *Gastroenterology*. 2006;130(5):1480-1491.

mitters, increases colonic motility, and inhibits visceral sensitivity to rectal distention. A dosage of 6 mg twice daily has been shown to improve global symptoms and constipation. Tegaserod is approved for short-term use and is contraindicated in those with severe renal impairment, moderate or severe hepatic impairment, or a history of bowel obstruction, symptomatic gallbladder disease, suspected sphincter of Oddi dysfunction, or abdominal adhesions.<sup>30,33,34</sup>

Antibiotics have been reported to be helpful in those with refractory diarrhea but should be used only when a bacterial source is suspected.<sup>30,35</sup> Other agents, such as peppermint oil, ginger, Chinese herbals, aloe vera, fennel, and probiotics, may have some role in the treatment of IBS, but more studies of these agents are needed before strong recommendations can be made.<sup>30,35</sup>

**Psychological and behavioral therapies** Significant methodologic limitations accompany the study of these modalities; however, cognitive behavior therapy, dynamic (interpersonal) therapy, and stress management or relaxation techniques including hypnosis, biofeedback training, meditation, and yoga may be useful tools. Patients with an associated psychological diagnosis, maladaptive coping styles, intermittent bowel symptoms of short duration, and exacerbations occurring at times of stress are most likely to benefit from psychological treatment.<sup>22</sup>

## Conclusion

While the pathophysiology of IBS remains something of a mystery, this condition is one of the most common seen in primary care and has a significant effect on quality of life. A thorough history and physical examination accompanied by appropriate testing help to rule out other conditions and establish trust and rapport. Treatments are intended to control symptoms and should be

chosen based on their severity and character. When diagnostic and therapeutic tools are used appropriately, IBS can be less challenging and frustrating to both patient and provider. □

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TABLE 4

### Medications used for IBS

- Alosetron, 1-2 mg daily
- Antispasmodics: Dicyclomine, 10-20 mg 2-4 times daily as needed; hyoscyamine, 0.125-0.25 mg q4h as needed; clidinium bromide/chlordiazepoxide, 1-2 capsules 3-4 times daily as needed
- Fiber, 20-25 g daily
- Loperamide, 2-8 mg daily, in up to 3 divided doses per day
- Selective serotonin reuptake inhibitors: fluoxetine, 10-60 mg daily; paroxetine, 10-50 mg daily; sertraline, 50-200 mg daily
- Tegaserod, 6 mg twice daily
- Tricyclic antidepressants (amitriptyline, nortriptyline, imipramine, desipramine): start with a low dose at bedtime or 2 times daily, and titrate slowly