



Colorectal cancer in women: An equal opportunity disease

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Colorectal cancer is the second leading cause of cancer-related deaths in developed countries. For women, it is the third leading cause of cancer-related deaths behind lung and breast cancers. Women have the same risk as men, and the lifetime risk of the development of colorectal cancer is 6%. One in 17 woman will have colorectal cancer diagnosed. There are risk factors unique to women, including gynecologic cancers, and treatment of gynecologic cancers, as well as delayed diagnosis in pregnancy. Fortunately, colorectal cancer is a preventable disease, as almost all colorectal cancers arise from premalignant polyps. Colorectal cancer screening is recommended in asymptomatic women aged 50 years and older who are at average risk. Screening and surveillance for colorectal cancer in women are important to improve the morbidity and mortality rates of this preventable disease.

(Key words: colorectal cancer, screening, surveillance, colonoscopy, fecal occult blood testing, flexible sigmoidoscopy)

In 2001, colorectal cancer (CRC) will be diagnosed in an estimated 138,900 Americans, and about 57,100 Americans will die of this disease.¹ It is projected that 68,100 new cases of CRC will have been diagnosed in women this year, and the disease will claim the lives of almost half of these patients. Cancers of the lung and bronchus, breast, and colon and rectum are expected to account for 51% of all cancer-related deaths in 2001.² More women will have died this year of CRC than of uterine, cervical, and ovarian cancers combined. However, nearly every case of sporadic colon cancer could be pre-

vented if every American were to undergo periodic colon cancer screening starting at age 50 years. About 6% of Americans will have CRC at some point in their lives. When CRC is diagnosed at an early stage, the 5-year survival rate is greater than 90%, yet only 37% of incident tumors are diagnosed while still localized.

Who is at risk?

Epidemiology

The incidence of CRC is similar in both men and women, but women have a higher prevalence of pure right-sided tumors and polyps.³ Colorectal cancer is the second leading cause of cancer-related deaths in developed countries, behind lung carcinoma. It is the fourth most common carcinoma in the United States and accounts for 13% of all cancers. It is third behind lung and breast cancers as a cause of cancer-related deaths in women. A woman's lifetime risk for CRC is about 6% (*Figure 1*).

Risk factors

The risk factors for the development of CRC are age, family history of colorectal carcinoma or polyps, personal history of colon carcinoma, polyps, or inflammatory bowel disease, and a history of prior pelvic radiation therapy (*Figure 2*).⁴ *Figure 3* outlines characteristics of polyps related to risk factors.

Genetic predisposition

A family history of colon cancer in a first-degree relative doubles an individual's risk of having colon cancer develop. Familial adenomatous polyposis (FAP) syndrome confers almost a 100% risk of the development of colon carcinoma. Colonoscopy in patients with FAP reveals hundreds to thousands of adenomatous polyps. The early onset of CRC and an array of other malignancies in the individual and the family characterize hereditary nonpolyposis colorectal cancer (HNPCC, Lynch syndrome). Individuals with the Lynch syndrome type I have proximal colon cancer diagnosed at an age two or more decades younger than the general population. This syndrome can be traced through at least two generations. At least three family members are affected and, in one member, CRC is diagnosed before the age of 50 years (*Figure 4*). Those with the Lynch syndrome type II have multisystem involvement, with the early onset of multiple sites of adenocarcinoma, in the colon, ovary, pancreas, breast, bile duct, genitourinary system, and stomach.

Risk factors unique to women

Gynecologic cancers

The association between gynecologic cancers and CRC suggests the possibility of a common environmental or genetic etiology. Yet, increased medical surveillance after the diagnosis of a first primary-site cancer or malignancy as a complication of treatment of the primary gynecologic tumor is also a possible link between the two.

■ **Ovarian cancer**—Women with a history of ovarian cancer have a CRC rate of average-risk women who are 4 to 8 years older; the relative risk (RR) for all CRCs was greater for patients who received radiation therapy. The study concluded that the age-adjusted RR was 1.6 for CRC in those individuals who had a prior diagnosis of ovarian cancer.⁵ In a study by Weinberg and colleagues,⁶ a major risk factor for CRC is ovarian cancer diagnosis at age 64 years or younger. Elevated risks for CRC in those younger than 50 years with ovarian cancer are similar in magnitude to the risk conferred by having a first-degree relative with CRC. In addition, relatives of women with ovarian cancer have a higher risk of the development of CRC and elevated rates of death from CRC.⁶ Less exposure to estrogen seems to have a protective effect against ovarian and endometrial cancers and

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CRC. Dietary factors and obesity are implicated in CRC (discussed in the section on prevention) and ovarian cancer, as estrogen levels are elevated in obese women.

The Lynch syndrome type II has an association with ovarian and endometrial cancers and CRC. In its relation with ovarian cancer, colon cancer usually develops in women before the age of 50 years, and the risk of ovarian cancer in these women is elevated fourfold over that of unaffected women.

■ **Endometrial cancer**—The age-adjusted RR for CRC after endometrial cancer is 1.4.⁵ Schoen and associates⁵ report that the increased incidence of rectal cancer was significant in those patients who received radiation therapy; these rectal cancers appeared in the time period consistent with the delayed carcinogenic effects of radiation. The increased risk of colon cancer, however, was independent of radiation therapy.

Women with endometrial cancer were found to have the CRC rate of average-risk women who were 3 to 5 years older. Those patients who received a diagnosis of endometrial cancer before age 50 years were three times more likely than women without endometrial cancer to have subsequent CRC; this risk is similar to that conferred by having a first-degree relative with CRC.


Black women with endometrial cancer seem to have a higher-than-expected risk for CRC. The more advanced stage of endometrial cancer at diagnosis, the higher the risk for CRC.

Among patients with Lynch syndrome type II, those with a history of endometrial cancer were at a 40% increased risk of the development of colon cancer compared with control subjects. The risk for CRC is also higher in women who have a first-degree relative with endometrial cancer. Again, decreased exposure to unopposed estrogen seems to protect against endometrial and colon cancers.

■ **Cervical cancer**—No apparent elevated risk exists in association with having a personal history of cervical cancer and the development of CRC.⁶

Breast cancer

The incidence of CRC in patients with a prior history of breast cancer is increased 10% (RR 1.1).⁵ The relationship between colon and breast cancers may be due to dietary factors such as fat and fiber consumption, hormonal factors such as par-




Checklist

Colorectal cancer (CRC) in women

- Colon cancer is the third leading cause of cancer-related death among women
- Lifetime risk is 6%
- Women at average risk appear to have the same risk for the development of CRC as men
- Ninety percent of colon cancers occur in persons older than 50 years

Figure 1. Summary of epidemiologic facts concerning colorectal cancer in women.



Checklist

Risk factors

- Age \geq 50 years
- History of CRC or adenomatous polyp in a first-degree relative
- Personal history of adenomatous polyps or CRC
- Previous diagnosis of endometrial or ovarian cancer
- History of prior pelvic irradiation
- Long-standing Crohn's colitis or ulcerative colitis

Figure 2. Risk factors for the development of colorectal cancer.

ity, and genetic factors such as those in the Lynch syndrome type II. In contrast, a recent study using a data base of 227,165 women concluded that women with a previous diagnosis of breast cancer were 5% less likely to have development of colonic adenocarcinomas and 13% less likely to have development of rectal adenocarcinomas when compared with women in the general population.⁷ The authors of that study postulate that exposures that cause breast cancer are protective against CRC.

Because no biologically plausible endogenous protective factors have been identified, further research in this area is necessary. It appears that women in whom breast cancer has been diagnosed have no increased risk of having subsequent CRC develop.

Colon cancer in pregnancy

Only 8% of CRCs occur before the age of 40 years, with an incidence of 1 in 50,000 to 1 in 100,000 pregnancies. As more women have children later in life, this incidence may increase.⁸ More than 80% of CRCs in pregnant women occur in the rectum in contrast to 31% in the general population.⁹ Symptoms of CRC in pregnant patients can be the same as those in nonpregnant patients (Figure 5). The symptoms of CRC are often overshadowed by the symptoms of pregnancy, which is the major problem in diagnosis; symptoms are assumed to be due to a normal pregnancy.

Screening guidelines

Cancers that are ideally suited for screening include those with a recognizable presymptomatic latent stage that if treated, favorably affects outcome. Optimal screening protocols include tests that are cost-effective, sensitive, specific, and risk-free and have acceptable positive and negative predictive values when applied to the population at large. Colorectal cancer is a highly preventable disease as almost all CRCs arise from premalignant polyps, and if these polyps are completely removed endoscopically or surgically, CRC will not occur in most cases.

Screening for CRC is recommended in asymptomatic women aged 50 years or older who are at average risk. Interestingly, in patient populations under the care of family physicians or internal medicine physicians, evidence suggests that a significant gender bias exists in patients undergoing screening for CRC. In one study, a significantly smaller proportion of women compared with men underwent flexible sigmoidoscopy for either screening or diagnostic indication.¹⁰ If the study findings are accurate, the gender bias in CRC screening rates would significantly affect the morbidity and mortality of CRC in women. Patient survey studies have indicated that the single most common reason stated by subjects for not undergoing flexible sigmoidoscopy is that a physician never recommended the procedure.¹¹

Recommendations for screening in people at average risk

Individuals at average risk for CRC are asymptomatic patients who are aged 50 years or older and have no known risk factors (Figure 2). Between 70% and 80% of all CRCs occur among patients at average risk.

Fecal occult blood testing should be offered yearly. Patients who have positive fecal occult blood tests should have a colonoscopy; an acceptable alternative is double-contrast barium enema examination, in addition to flexible sigmoidoscopy in those not able to undergo colonoscopy.


Flexible sigmoidoscopy every 5 years in addition to yearly fecal occult blood testing is recommended for patients at average risk. Yet, it has recently been reported that one-time screening of asymptomatic patients with fecal occult blood testing and sigmoidoscopy fails to identify about one quarter of those with advanced neoplasia.¹² At the time of flexible sigmoidoscopy, biopsy of polyps smaller than 1 cm should be done, and if adenomatous polyps are detected, a full colonoscopy should be done to remove that polyp as well as to examine the remaining bowel. If the polyps are larger than 1 cm, a colonoscopy should be recommended.

Double-contrast barium enema examination can also be offered every 5 to 10 years for persons who are at average risk. This procedure has a slightly lower risk than endoscopy, yet it can miss small polyps. Furthermore, if a polyp is detected, a second procedure will need to be done to remove those lesions or do a biopsy of them.

Screening colonoscopy can be offered every 10 years, as few polyps will arise and progress to advanced cancer in that time period in patients who have no specific risk factors.¹³ The obvious advantages are that the entire colon can be visualized and any polyps or cancers can be removed or a biopsy can be done at the time of the examination. Incidentally, as of July 2001, traditional Medicare will reimburse physicians and facilities for performing a screening colonoscopy in "average risk" patients. A colonoscopy is covered if the patient has not had a prior colonoscopy or flexible sigmoidoscopy within the past 10 and 4 years, respectively. Some states (such as Virginia) have mandated that all health insurance programs pay for screening colonoscopy in everyone aged 50 years and older.

Recommendations for people at increased risk

For those with first-degree relatives (siblings, parents, or children) who have had CRC or an adenomatous polyp, the same screening options are recommended as for an individual at average risk, except




Checklist

Characteristics of polyps

- Risk of a polyp becoming malignant appears to be related to:
 - time,
 - size, and
 - histologic characteristics
- Time from polyp formation to malignant transformation is approximately 7 to 10 years

Figure 3. Characteristics of colorectal polyps.




Checklist

Amsterdam criteria

- Three family members with colorectal cancer; two must be first-degree relatives of each other
- Affected family members span two generations
- One of the family members must have had colorectal cancer diagnosed before the age of 50 years

Figure 4. Amsterdam criteria for hereditary nonpolyposis colorectal cancer.



Checklist

Symptoms and signs

- Asymptomatic
- Unexplained weight loss
- Unexplained anemia
- Rectal bleeding
- Change in bowel habits
- New onset abdominal pain
- Tenesmus

Figure 5. Symptoms and signs of colorectal cancer.

that such screening should begin at age 40 years.

Individuals with a family history of FAP can have genetic testing to determine if they carry the gene, provided that the

index patient with the disease carries the genetic defect. Those patients considering genetic testing should be referred to a gastroenterologist and a genetic counselor so that they can make an informed decision about undergoing genetic testing and understand the meaning of the results. Gene carriers or persons with indeterminate test results should be offered flexible sigmoidoscopy every year beginning at puberty to see if polyposis exists. If polyposis does exist, a decision about the timing of colectomy should be made, as those with FAP have a nearly 100% chance of the development of CRC in an intact colon by the age of 40 years. Yearly examinations will detect polyposis long before cancer would develop, and because polyps are found throughout the colon, sigmoidoscopy is sufficient.

Those patients with a family history of CRC in multiple close relatives and over many generations may be part of a cancer family syndrome. If such patients fit the definition for HNPCC, they should receive genetic testing under the supervision of a gastroenterologist and a genetic counselor. They should have a colonoscopy every 1 to 2 years starting between the ages of 20 and 25 years and yearly after age 40 years, as these polyps tend to progress to cancer more rapidly than is the norm. The polyps are predominantly proximal to the splenic flexure and will be missed with a sigmoidoscopic examination.

Patients who have had an adenomatous (pre-malignant) polyp at the initial screening are likely to form metachronous polyps on follow-up and need repeated colonoscopic examinations. In the National Polyp Study,¹⁴ the total adenoma recurrence rate for patients who underwent surveillance colonoscopy at 1 year after index polypectomy was 41.7% compared with 32% in the group that was examined only at 3 years. Despite this difference, the percentage of patients in whom advanced adenomas developed (larger than 1 cm or villous histology or high-grade dysplasia present) was identical in both groups. A complete colonoscopy should be done at the time of polypectomy, clearing all existing adenomas. This clearing may take more than one session for large or multiple polyps. Colonoscopy is then repeated in 3 years to check for missed synchronous or metachronous adenomas. If the findings are negative, the surveillance interval may be increased to 5 years. In those patients in whom the

initial clearing examination was suboptimal or in those patients who had multiple adenomas, follow-up at 1 to 4 years may be considered at the discretion of the endoscopist.

In patients who have inflammatory bowel disease, surveillance colonoscopy should be done every 1 to 2 years after 8 years of disease in patients with pancolitis or at the same interval after 15 years in patients with colitis involving only the left side of the colon. Total colectomy eliminates the subsequent risk of CRC. Total colectomy is indicated for both ulcerative colitis and Crohn's colitis if high-grade dysplasia is confirmed by two expert gastrointestinal pathologists; it is also considered for those patients who have low-grade dysplasia.

Treatment

The treatment of CRC is surgical resection with 5-cm margins from the involved segment and removal of the corresponding lymphatic drainage. In those patients with rectal carcinoma, low anterior resection is done if an adequate distal margin of at least 2 cm can be achieved. This rectal-sparing procedure aids the patient in maintaining fecal continence and does not seem to alter prognosis over that afforded by abdominal perineal resection.

Levamisole hydrochloride and 5-fluorouracil are used as adjuvant chemotherapy for patients with metastases to regional lymph nodes, decreasing the recurrence rate by 41% and mortality by 33%. Patients with extension of tumor through the muscularis propria may also benefit from adjuvant chemotherapy. Radiation therapy plus 5-fluorouracil has been shown to decrease the recurrence rate in patients with rectal cancer who have evidence of metastasis to regional lymph nodes or invasion of carcinoma through the bowel wall.¹⁵

The treatment of the pregnant patient is the same as that of the nonpregnant patient; surgical resection of the primary tumor and of regional mesenteric lymph nodes is the only curative therapy. During the first 20 weeks, the malignancy requires priority over the pregnancy, and the patient should be treated as though she were not pregnant. Delaying treatment for several months until the fetus is viable could result in dissemination of the tumor. A decision regarding treatment must be made with extensive discussion between the patient and the treating physicians and surgeons. It has been reported that

there is a 25% chance of concurrent ovarian metastases in women younger than 40 years.¹⁶ Therefore, some physicians recommend oophorectomy, especially in patients with low-lying rectal cancers.

Measurement of the carcinoembryonic antigen (CEA) level is not recommended as a screening tool for the general population. However, if the CEA level is elevated once cancer is diagnosed, it can be followed up postoperatively for evidence of recurrence.¹⁷ The CEA level may be elevated owing to pregnancy and is of little value as a diagnostic test.¹⁸ Digital rectal examination, fecal occult blood tests, and flexible sigmoidoscopy with follow-up colonoscopy are done as indicated. Barium enema examinations are contraindicated in pregnant patients, as are computed tomography scans to look for metastases. Hepatic ultrasound examination is a sensitive modality to evaluate for liver metastases and is not contraindicated during pregnancy.

Follow-up colonoscopy after treatment for colorectal cancer

Those patients who had a CRC that has been resected with "curative" intent and in whom the findings of preoperative colonoscopy were otherwise normal should receive subsequent surveillance in 3 years and then every 5 years if the findings are negative for metachronous polyps or cancers (or both). In patients with rectal cancer who did not undergo radiation therapy, flexible sigmoidoscopy should be repeated within 1 year to check for local recurrence.¹⁷

Morbidity and mortality

Colorectal cancer-related death rates have been decreasing 1.8% per year on average since 1984, with equally strong declines among both men and women. The most commonly used modification of Dukes' system is that of Astler and Coller.¹⁹ This classification uses the following designations; 5-year survival rates are indicated in parentheses:

- A**, tumor involving the mucosa and submucosa (80%);
- B1**, tumor going into, but not through, the muscularis propria and without nodal involvement (65%);
- B2**, tumor penetrating through the bowel wall but without regional lymph nodal involvement (43%);
- C1**, B1 tumor characteristics with involvement of regional nodes (53%);
- C2**, B2 tumor characteristics with

involvement of regional nodes (15%)¹⁹; and

D, distant metastases (5%), a later modification by Turnbull and colleagues.²⁰

The depth of invasion and the extent of regional lymph node involvement are important in determining prognosis. In the evaluation of a pregnant patient, stage for stage, the prognosis is the same as that for the nonpregnant patient. Unfortunately, most pregnant patients have advanced-staged lesions at diagnosis for reasons mentioned previously. Other than masking CRC symptoms commonly attributed to the normal pregnant state, no evidence exists that pregnancy influences the usual course of disease. The prognosis for infants born to mothers with colorectal malignancies is good; the disease has no known effect on the fetus.⁹ Malignant involvement of the placenta or fetus is exceptionally rare. The maternal mortality rate related to CRC diagnosed during pregnancy is at least 50%.

A recently published study indicated that women who receive curative rectal cancer resection have a higher disease-free and overall survival rate when compared with that of men. The reason for the difference is not clearly evident. Proposed reasons are that sex steroids may contribute to better postoperative immune function, as testosterone has detrimental effects on immunity, whereas female sex steroids exert an immune-stimulatory effect.²¹

Prevention Diet

Mutagenic compounds may be present in the stool of people who eat a Western diet, contributing to the development of CRC. Diets rich in saturated fats and meat and low in fiber content have been implicated in the increased risk for CRC. Emigration to countries with a Western diet from countries with a baseline low incidence of CRC increases the risk of having CRC develop to that of the Western population by the first generation, suggesting a crucial role for some environmental factor, likely diet.²² Diets with high fiber content may decrease the risk of CRC by lowering levels of carcinogens in the bowel. Some studies have failed to show that high-fiber intake can help to prevent formation of adenomatous polyps, which are considered to be precursor lesions for CRC.²³ Because fiber has other health benefits, most clinicians generally recommend a diet high in fiber content.



Checklist

Protective factors

- Diet high in fiber content and low in saturated fats
- Postmenopausal estrogen replacement therapy
- Abstinence from cigarette smoking and alcohol ingestion
- Folic acid supplementation
- Use of aspirin and other non-steroidal anti-inflammatory drugs
- Active lifestyle and absence of obesity
- Calcium supplementation

Figure 6. Factors that protect against colorectal cancer.

Other factors

Some studies have shown a positive correlation between alcohol intake and carcinoma of the colon in both men and women.^{24,25} Cigarette smoking has been identified specifically for women as a risk factor for CRC. The length of time of smoking is directly related to the risk of the development of colorectal carcinoma. Even those women who quit smoking had a higher incidence of colorectal carcinoma than nonsmokers, possibly as a result of exposure of the colon to potential carcinogens.²⁶

Use of postmenopausal hormone replacement therapy may diminish the risk for the development of CRC as estrogen may have a protective effect. Possible biologic explanations for the effect include favorable changes induced by estrogen in bile synthesis and excretion, and the reduction of bile acid concentrations in the colon. Estrogen receptors have been identified in colonic epithelial cells and serve to inhibit cell proliferation.²⁷

After 15 years, women who consumed multivitamins containing folic acid (daily intake > 400 µg) were found to have a markedly lower risk of colon cancer.²⁸

Aspirin may also be beneficial in preventing CRC. Epidemiologic studies of patients taking low-dose aspirin have shown significant reductions in relative risk of CRC in women, though a statistically significant reduction in risk was not realized until 20 years of regular use of aspirin.²⁹ In patients with FAP, long-term use of nonsteroidal anti-inflammatory drugs (NSAIDs) results in significant

reductions in size and number of adenomatous polyps. NSAIDs are used as an adjunct to surgery. The polyps usually recur after cessation of NSAID use. Studies are currently evaluating use of cyclooxygenase 2 (COX-2) inhibitors in the prevention of sporadic adenomatous polyps.

Calcium supplementation consisting of 1200 mg of elemental calcium was associated with a significant reduction in the risk of recurrence of adenomatous polyps in 930 subjects, a quarter of whom were women. This protective effect of calcium appeared to be independent of dietary fat and calcium intake at the beginning of the study period.³⁰ Calcium acts by inhibiting both mucosal injury and increase in cell proliferation induced by carcinogens.³⁰

Increased body weight and obesity are associated with increased mortality from several cancers. A meta-analysis of six published studies reported a 15% increase in the risk of development of colon cancer for an overweight person compared with a patient whose weight was within normal range. This risk increased to 33% if the patient was obese as indicated by a BMI equal to or greater than 30.³¹ Figure 6 outlines factors that protect against CRC.

Comments

Colon cancer mortality rates have declined during the past 16 years. It is imperative that practitioners continue to make strides at screening patients for detection of polyps before their evolution into malignancy. Mammograms, Papanicolaou smears, and colon cancer screening should be equally considered when evaluating female patients in the office.

Colorectal cancer is a preventable disease, and its incidence would be markedly reduced if all patients at risk were screened effectively. Emphasis should be given to primary prevention by educating patients about dietary and lifestyle factors.

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Irritable bowel syndrome in women: The physician-patient relationship evolving

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Irritable bowel syndrome (IBS) is one of the most common functional gastrointestinal disorders seen by primary care physicians and specialists. The disorder affects approximately 15% to 20% of the world's population and is predominately found in women. Despite the high prevalence of IBS in the general population, our understanding of the disorder's diagnosis, etiology, and treatment options are limited. This deficiency in our understanding is the foundation to the distressed physician-patient relationships that are commonly found with this disorder. By becoming familiar with the diagnostic criteria for IBS and gaining a stronger understanding of the biopsychosocial factors of IBS symptomatology as well as the available treatment methods, the primary care physician or specialist can ensure greater confidence in making a correct diagnosis and in making other professional decisions with patients with IBS. Improvements in these areas will foster a supportive environment for a therapeutic relationship between physician and patient, thereby optimizing quality patient care and treatment outcome.

(Key words: irritable bowel syndrome, functional gastrointestinal disorders, biopsychosocial model, physician-patient relationship)

Irritable bowel syndrome (IBS) is a complex disorder that affects a significant portion of the world's population and is the most common functional gastrointestinal (GI) disorder seen by primary care physicians and specialists. Despite recent advancements in our understanding of the disorder's physiology and etiology, IBS remains difficult to diagnose and treat. These challenges commonly make physicians frustrated with understanding and properly treating a patient with IBS. Many patients seek medical care in fear that they have cancer or some other organic bowel disease. Furthermore, the pejorative views of IBS shared by many in the medical community can leave the patient feeling misunderstood and frustrated at the thought of being stigmatized with a neurotic label. By dealing with concerns and fears about serious illnesses and understanding the psychosocial dimensions of IBS, patients can leave the physician's office reassured and

educated with a better understanding of their diagnosis.

Epidemiology and impact on society

The impact of IBS on our society needs to be examined from the perspective of prevalence, its impact on the healthcare industry, and the financial burden it has brought to our society. Irritable bowel syndrome is characterized by symptoms of abdominal pain, altered bowel movements, bloating, and disordered defecation. Empiric studies have reported that as much as 75% of individuals have had symptoms of IBS and approximately 15% to 20% meet the diagnostic criteria.¹⁻⁵ In comparison, prevalence rates for other common diseases are diabetes mellitus, 3%; asthma, 4%; heart disease, 8%; and hypertension, 11%.⁶ Although a high prevalence of individuals meet IBS diagnostic criteria, only a small percentage of these individuals seek medical attention.

Studies have found that the prevalence of IBS in the community is much higher in females, an estimated 3-to-1 ratio to males.⁷ Irritable bowel syndrome is the most common functional GI disorder, and it is one of the top 10 reasons for visits to primary care physicians.⁸ Addi-

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