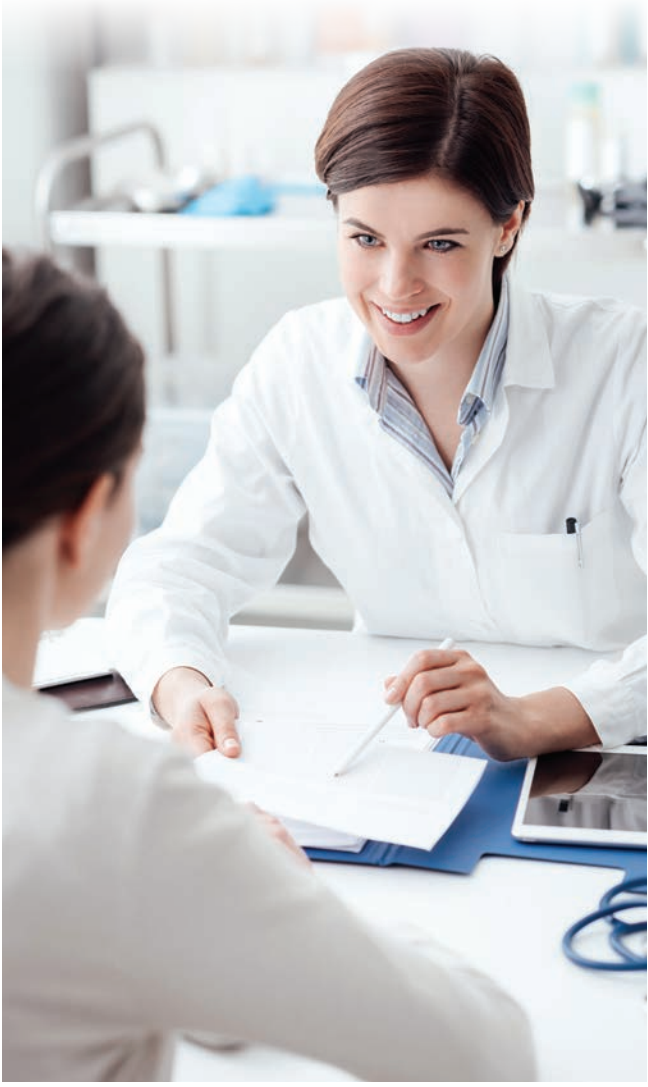
CROHN'S
&COLITIS
FOUNDATION

Diagnosing and Monitoring IBD



What's Inside

When you or a family member experience gastrointestinal symptoms that do not resolve on their own or respond to over-the-counter treatments, you know that you need to get help quickly. While you may see your primary care provider first, you should also consult with a specialist in gastrointestinal disease, or a gastroenterologist, to aid in making a diagnosis and initiating proper treatment. If there is a reasonable suspicion of inflammatory bowel disease (IBD), such as Crohn's disease or ulcerative colitis, it is best to seek out a gastroenterologist who specializes in treating IBD.

If your health plan does not provide access to a gastroenterologist, find a primary care provider with the most experience in diagnosing gastrointestinal (GI) illness. These healthcare providers can refer you for the tests and procedures discussed in this brochure, which will be the basis for making your diagnosis, finding the best therapies, and managing your condition.

Finding out if you have IBD may require many tests. This brochure explains which tests you may need to undergo to make a clear diagnosis as well as to monitor the ongoing status of your Crohn's disease or ulcerative colitis. Although it is not possible to cover every diagnostic test in a brochure, the most common tests have been included. If you have a question about a test not mentioned here, contact the Crohn's & Colitis Foundation for more information at *www.crohnscolitisfoundation.org* or 888-MY-GUT-PAIN (888-694-8872).

Do you have IBD?

Crohn's disease and ulcerative colitis belong to a group of conditions known as inflammatory bowel disease (IBD).

It is important to bear in mind that IBD is a chronic illness and requires proactive care. Successful disease management begins with an accurate diagnosis. Your physician will need to identify the extent of the disease as well as its precise location in the GI tract to help select the most effective therapy for your IBD.

Crohn's disease or ulcerative colitis?

While Crohn's disease and ulcerative colitis produce similar symptoms and use similar therapies, they are not the same. In ulcerative colitis, inflammation affects only the innermost lining of the colon (large intestine) called the mucosa. Ulcerative colitis always starts from the rectum and can spread continuously to the rest of the large intestine.

Crohn's disease, on the other hand, may affect any part of the GI tract, from the mouth to the anus. Unlike ulcerative colitis, Crohn's disease can skip large segments of the bowel. The most commonly affected areas are the lower part of the small intestine (ileum) and the large intestine. Also, in patients with Crohn's disease, the inflammation does not stop at the mucosa and can involve the entire thickness of the bowel wall.

Indeterminate colitis

In some individuals, it is difficult to determine whether they have Crohn's disease or ulcerative colitis—even after testing. This happens in 1 out of every 10 people with IBD. When there are overlapping features of both Crohn's disease and ulcerative colitis, we call this indeterminate colitis (IBD-Undefined).

Could it be something else?

Typical symptoms of IBD include abdominal pain, cramping, diarrhea, rectal bleeding, fecal urgency, and extreme fatigue. These are the result of inflammation of the intestine and may be similar in both Crohn's disease and ulcerative colitis.

In 25%-40% of patients, the classic signs and symptoms of IBD may be accompanied by symptoms in the eyes, joints, skin, bones, kidneys, and liver. These non-gastrointestinal symptoms are called extraintestinal manifestations (EIMs). Children who develop IBD often experience growth problems without other intestinal symptoms.

Because the gut has only a limited number of ways to show distress, many of the above symptoms are nonspecific and could also be related to other gastrointestinal conditions. These include infectious gastroenteritis, traveler's diarrhea, celiac disease, gallbladder disease, pancreatitis, stomach ulcers, irritable bowel syndrome, and colorectal cancer. Ruling out other possible diseases is part of the diagnostic process.

The diagnostic process

Your physician will take your history and perform a physical exam. They may order various tests in order to make a diagnosis of IBD and help identify whether you have Crohn's disease, ulcerative colitis, or indeterminate colitis. These tests fall into several categories. Some are invasive (performed inside the body) while others are non-invasive, such as obtaining blood samples, stool samples, or radiographic images of the suspected disease site.

Although tests may seem intimidating at first, they are well tolerated by most patients. Children will need extra support and coaching,

but remember that pediatric specialists routinely perform these tests and can advise you on how to make the process easier for your child.

Patient history and physical exam

The first diagnostic step will be taken during your initial doctor visit. A gastroenterologist is the most qualified healthcare specialist to diagnose IBD. You will need to provide as much information as possible about your symptoms. It can help to keep a diary listing your symptoms, including bowel movements, bleeding episodes, waking up at night from pain or diarrhea, fevers, joint aches, or other symptoms. The diary should include when symptoms started, how often they occur, how long they last, and what makes them better or worse.

The physical exam will focus on the GI tract, including inspection of the anus and possibly the rectum.

Genetics and family history

It also helps to investigate your family tree to identify relatives who may have had IBD, autoimmune diseases, or other serious, chronic GI issues. Having an immediate family member with IBD is the number-one risk factor for developing Crohn's disease or ulcerative colitis, although most patients with IBD do not have a family history of the disease.

Blood and stool tests

Physicians commonly use blood tests as part of their diagnostic workup. Blood tests involve a blood draw from a vein in your arm.

To collect a stool sample, your healthcare provider will give you a stool collection kit along with specific instructions. You want to ensure that the sample does not touch the inside of the toilet.

Blood and stool analysis can determine the presence of inflammation in the body. Although these tests will not reveal what's causing the inflammation, they do inform the physician to perform other types of tests to identify the source of the inflammation.

Blood tests are useful in several other ways:

- A complete blood count (CBC) can show signs of inflammation or infection through an increased white blood cell count.
- Anemia may be detected through red blood cell measurements.
- Liver and kidney function tests can be performed to assess the effects of IBD, or the medications used to treat the disease, on the organs.
- An electrolyte panel is important to check for dehydration and side effects of medications.

Blood tests can help determine whether you are at risk for a specific complication related to a medication, and how well you may respond to a particular medication moving forward.

Blood tests are part of both the initial workup and ongoing follow-up and monitoring of your condition. They usually do not require any special preparation. See the Routine Blood and Stool Tests table on pages 14 and 15.

Markers of inflammation

Proteins found in blood and stool, also called biomarkers, may be useful for detecting inflammation. Stool biomarkers include calprotectin and lactoferrin. Blood biomarkers include C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR). Research has shown that these biomarkers are useful in predicting IBD activity, but they are also present in other GI diseases. These blood and stool tests may be more helpful determining who needs more invasive testing, detecting flares, and improving

medical therapies than for diagnosing IBD. The use of some biomarkers is relatively new, and they are not used by all physicians or covered by all insurance policies.

Ruling out infections

Gastrointestinal infections with similar symptoms may be identified by testing small stool samples. These tests may look for *C diff, E coli, Campylobacter, Yersinia, Salmonella, Shigella,* and other infections.

Specialized blood tests

There are a variety of specialized blood tests that researchers have associated with IBD, such as pANCA, ASCA, CBir1, and OmpC. However, these tests are NOT to be used to make a diagnosis of IBD as they can be present in people without IBD. Sometimes, these markers may be helpful differentiating between Crohn's disease and ulcerative colitis when there is uncertainty at time of diagnosis.

Tests for optimizing therapy

Thiopurine methyltransferase (TPMT) and NUDT15 testing may be ordered when physicians are considering the use of mercaptopurine or azathioprine in patients. This testing can help to determine whether you are at risk for serious complications with these medications and what the optimal starting dose should be for each individual.

Immunosuppressive drugs, such as anti-TNF and interleukin inhibitors (also known as biologic therapy), can cause reactivation of a latent (silent) tuberculosis or hepatitis B infection. All patients need to be screened for these diseases before starting treatment.

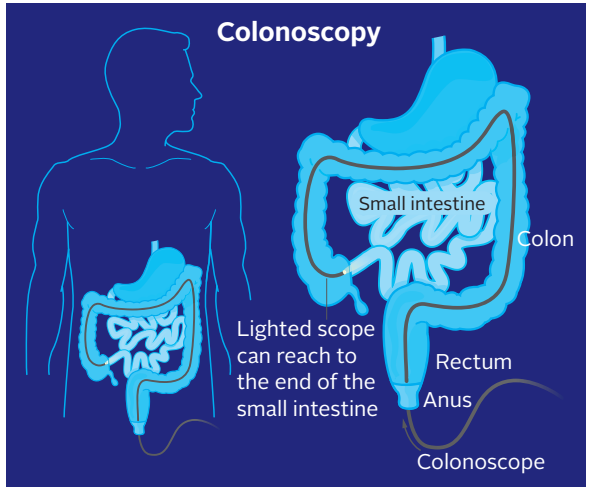
For more information on IBD treatments, download the Foundation's *Understanding IBD Medications and Side Effects* brochure by visiting *www.crohnscolitisfoundation.org*.

Endoscopic procedures

An endoscopy is a procedure that lets your doctor look inside your GI tract. Endoscopes are inserted into the body through the mouth or the anus, and have a tiny camera attached to a long, thin, flexible tube that allows your physician to see images of your intestine magnified on a screen. Endoscopy helps your physician see if inflammation is present, which parts of the intestines are affected, the severity of the inflammation, and obtain biopsies to confirm the findings. Endoscopy is also vital for monitoring your response to the therapy. Healing of the lining of the intestine is a sign that your medication is effective.

There are different types of endoscopies to look at different parts of the GI tract:

Colonoscopy: Given that the colon and end of the small intestine are most frequently involved in IBD, a colonoscopy is often performed to both diagnose and monitor IBD. A specially trained physician will guide a colonoscope into your rectum and through the entire length of the colon to the end of the small intestine (terminal ileum). Patients are typically given sedation during the procedure so they sleep through and do not even recall that the test took place.



Before your test, you will typically drink a preparation fluid that purges your colon of stool and debris by causing diarrhea. In order for your physician to see the intestinal lining, it is important to wash out stool prior to the procedure. The preparation fluid may have an unpleasant taste. The colon preparation is time-consuming and can be uncomfortable; however, the result will be a clean intestine, with a clear view of the intestinal lining for a successful colonoscopy.

For a colonoscopy, you should expect to:

- Receive restricted diet instructions and follow them prior to the procedure.
- Drink a bowel preparation prescribed by your physician.
- Dedicate the night before your test to complete the bowel preparation process.
- Wear loose, comfortable clothing to your procedure.
- Have a friend or family member drop you off and pick you up after the procedure.

Colonoscopies are generally very safe procedures, but there is an extremely small risk of perforating (puncturing) the bowel during the exam, which may be increased if you have IBD. You may want to discuss the risk and other potential complications with the physician performing the test.

Many patients ask about the usefulness of a less invasive "virtual colonoscopy," or CT colonography. Although these radiology-based tests are an exciting new development, they are not recommended for suspected IBD, where biopsies and direct viewing of the colon and small bowel are required.

Sigmoidoscopy: This is an exam similar to a colonoscopy, but instead of looking at the entire colon it evaluates the lower one-third of the colon and is used in patients with ulcerative colitis. Because the procedure is very brief, it is often performed without a sedative and is associated with less discomfort than a colonoscopy. The preparation for this procedure is often less complex than a colonoscopy, usually requiring only one or two enemas the day of the procedure.

Esophagogastroduodenoscopy (EGD) or upper endoscopy: This is an endoscopic evaluation of the upper end of the digestive system that evaluates a wide variety of symptoms, including but not limited to upper abdominal pain, nausea, vomiting, and difficulty swallowing. An EGD typically requires fasting after midnight until the time of the test. A longer upper endoscope, called an enteroscope, can be used to look for inflammation further into the small bowel. A standard enteroscopy can typically evaluate the first one-third of the small bowel.

Video capsule endoscopy (VCE): This procedure allows your physician to view areas of the bowel that cannot be reached with traditional scopes. VCE involves swallowing a pill-sized camera that takes pictures of the small intestine and bowel as it travels through your GI tract over the course of 8 to 12 hours. The images are wirelessly sent to a receiver that you wear. These images are downloaded and reviewed by your doctor to look for any abnormalities in the small bowel. The capsule is passed during a bowel movement, usually within a day.

Endoscopic ultrasound (EUS): This technique uses an ultrasound probe attached to an endoscope to obtain deep images of the gut below the surface. With IBD, physicians use EUS most often to look at fistulas in the rectal area. Fistulas are abnormal connections from the intestine to another part of the intestine, another organ in the body, or the skin.

The role of biopsy and the surgical pathologist

A pathologist is a physician who will examine biopsy tissue that has been obtained from an endoscopy or through surgery under the microscope for specific features that help make the diagnosis of IBD. In addition, the pathologist may identify findings that can determine whether the disease is ulcerative colitis or Crohn's disease. Results from the evaluation of biopsies can take as long as one week. Pathologists also look for the presence of any abnormal cells, such as precancerous or cancerous, in the inflamed area of the intestine.

Radiology scans or diagnostic imaging

Traditional upper endoscopy and colonoscopy will not be able to evaluate about two-thirds of the small intestine. Therefore, in addition to capsule endoscopy, radiologic exams or diagnostic imaging are performed to evaluate these segments of intestines and areas outside the bowel.

The Image Test table on pages 14 and 15 discusses the possible location of IBD or complication as well as the radiology and endoscopy tests that you may undergo.

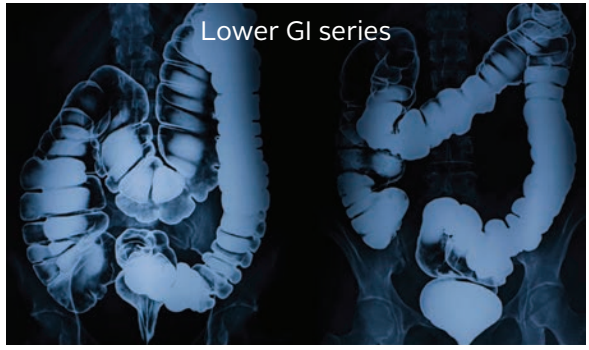
X-rays

X-rays are the oldest way of imaging the inside of the body. X-rays are inexpensive and useful for detection of blockages in the small or large intestine. Patients with Crohn's disease can have inflammation and/or scarring of the small bowel that narrows the intestine and prevents the easy passage of stool and air. This is called a small bowel obstruction. Likewise, the large bowel can also become blocked and dilated. Rarely, people with ulcerative colitis can develop enlargement of the large bowel called toxic megacolon. These are serious complications that can be seen on a plain X-ray. No preparation or contrast material is required with an X-ray. The test exposes you to a small amount of radiation.

Barium contrast studies

Barium studies use contrast material (barium) with traditional X-ray technology. Barium is a chalky, milky liquid that you drink prior to the procedure. A series of X-rays are taken to observe the material flowing through the digestive system. The studies include:

- **Upper GI series** examines the esophagus, stomach, and first part of the small bowel (duodenum).
- **Small bowel series and small bowel enteroclysis** examines the entire small bowel. For a small bowel series, you will drink several cups of barium and then have an X-ray taken every 15 to 30 minutes as the barium travels down the small intestine and enters the large intestine. The time required is varied but can be as long as four to five hours. An enteroclysis is similar, except that the barium is placed directly into the small intestine through a tube in the nose or mouth.
- **Lower GI series** involves inserting the contrast material directly into the rectum (barium enema) and provides images of the colon. During the exam, the colon is distended with air to provide better images.



Expect to spend at least half the day at the hospital, ambulatory care center, or physician's office for the small bowel or large bowel evaluation. Your healthcare provider will give specific instructions for preparing for the test. The test exposes you to small amounts of radiation.

In the management of IBD, these studies have largely been replaced by cross-sectional imaging (see below) in conjunction with endoscopy.

Cross-sectional imaging

Cross-sectional imaging is comprised of computed tomography scanning (CT scan) and magnetic resonance imaging (MRI). These techniques are extremely helpful in diagnosing and managing IBD. These imaging studies can evaluate the entire thickness of the bowel wall and can detect inflammation and complications such as fistulas, abscesses, and obstruction.

A CT scan, also known as a CAT scan, takes simultaneous X-rays from several different angles to reconstruct a three-dimensional image of your internal organs. It may involve a contrast material delivered orally, rectally, or intravenously to improve the quality of the test. During the test, you will be on a special table that advances through the scanner to take images at each level of your abdomen. Newer scanners have an open design to minimize claustrophobia. A CT scan of the abdomen takes 5 to 20 minutes to complete. The CT scan is used to rule out complications of IBD, such as intra-abdominal abscesses, strictures, small bowel obstructions or blockages, fistulas, and bowel perforation.

CT enterography (CTE) is a variation of a CT scan. During this exam, a special oral and/or intravenous contrast agent is given to better outline the intestines. In addition, CTE reconstructs a three-dimensional image to better visualize the small bowel in relation to other organs. Your physician may suggest this exam to identify areas of inflamed bowel and more subtle obstructions or blockages.

These tests expose you to radiation. You may discuss with your physician whether imaging alternatives, such as MRI, are more appropriate for you. See Radiation Risks on page 16 for more information.

Be aware that some patients are allergic to the contrast agent in intravenous form. Let the technician know if you think you have an allergy. Patients with kidney disease, diabetes, or dehydration are at increased risk for kidney side effects from the intravenous contrast material.

Magnetic resonance imaging (MRI)

An MRI is a useful way to view the abdominal organs and the GI tract. It can also identify inflammation and complications such as fistulas and obstruction. The machine moves along the body using magnetic waves to take pictures, which generate a two- or three-dimensional image that can be viewed as a series of cross sections. One of the advantages of an MRI is that it does not involve radiation exposure. However, it is generally more expensive and also takes longer to perform. Patients who are claustrophobic may have difficulty with an MRI since it is more confining. Tell your physician if you have concerns about enclosed spaces.

Magnetic resonance enterography (MRE) can give a detailed picture of the small and large intestine, similar to CT enterography.

Magnetic resonance cholangiopancreatography (MRCP) is a specialized MRI exam that provides a view of the bile ducts, gall bladder, liver, and pancreas. This test helps diagnose primary sclerosing cholangitis (PSC) in IBD patients, a condition characterized by severe inflammation and scarring in the bile ducts.

Routine Blood and Stool Tests*

Test	Descriptive Name	Helps to Diagnose
CRP	C-reactive protein	Inflammation (non-specific)
ESR	Erythrocyte sedimentation rate	Inflammation (non-specific)
CBC	Complete blood count	Anemia, infection, inflammation (non-specific)
Electrolytes	Sodium, Potassium, Chloride, CO2	Dehydration
Liver Function	Liver enzymes	Medication side effects, PSC
Vitamin B12, Iron, Zinc, Folate		Anemia, nutritional status
Vitamin D		Bone mineral status
Calprotectin	Stool protein	Active intestinal inflammation
Lactoferrin	Stool protein	Active intestinal inflammation

Specialized Blood Tests*

Test	Descriptive Name	Potential Usefulness
pANCA	Perinuclear anti-neutrophil antibody	Distinguishes UC from CD
ASCA	Anti-Saccharomyces cervisiae antibody	Distinguishes CD from UC
CBir1	Anti-flagellin antibody	Indicative of Crohn's disease
OmpC	Anti-OmpC antibody	Indicative of Crohn's disease
TPMT	Thiopurine methyltransferase	Safety and starting dose of azathioprine or 6-MP
NUDT15	Nudix hydrolase 15	Safety and starting dose of azathiorprine or 6-MP

Imaging Tests*

Suspected IBD Location or Complication	Possible Tests
Ileocolonic disease	Colonoscopy, SBFT/enteroclysis, CTE, MRE, capsule endoscopy (CE)
Upper tract Crohn's disease	EGD-Upper GI series (UGIS)
Perianal Crohn's disease	MRI-EUS
PSC	ERCP and MRCP
Pancreatic and bile ducts	MRCP
Perforations, blockages, abscesses	Plain X-ray and CT scan

*This is not a complete list of all possible tests. Speak with your healthcare provider regarding other tests.

Ultrasound

Ultrasound technology is used to study many organs in the abdomen: typically the liver, gall-bladder, and those in the pelvic area. Currently, endoscopic ultrasound and MRI are both used to diagnose perianal Crohn's disease. Physicians in the U.S. do not typically use ultrasound to evaluate the small bowel; however, in Europe, they use ultrasound more often to assess for blockages in the small bowel. Ultrasound emits no radiation and relies on the shadows cast by inaudible sound waves. Although ultrasounds do not usually require preparation (other than not eating for a few hours before the test), you should check with your physician to be sure.

Radiation risks

There is research to indicate that radiation is a risk factor for cancer. It is clear that health-related radiological scans contribute the most to radiation exposure for the majority of patients. CT scans currently generate the largest amount of radiation among the types of scans discussed in this brochure. Despite the radiation exposure associated with a CT scan, it is still a very useful test for diagnosing IBD and its complications. However, other exams, such as MRI and ultrasound, are being used increasingly to reduce radiation exposure for patients.

You and your physician will discuss the risks and benefits of all your options. While there are no risk-free options, the absolute risk associated with radiation from imaging is much lower than the risk of having poorly controlled IBD due to inadequate monitoring of your disease.

If you think you may be pregnant, or if you are trying to become pregnant, inform your physician as it is important to minimize the risk of radiation exposure.

Monitoring your health

With proper treatment and monitoring, you will maximize your chances of good health and decrease the likelihood of missing signs and symptoms of ongoing disease.

Once you are diagnosed and begin treatment, there may be regular follow-up appointments to monitor your disease, check for signs of a flare, address any changes in symptoms, and identify possible side effects of treatment. During these follow-up appointments, your physician may order several tests on a regular basis, including:

- **Complete blood count**
- **ESR**
- **C-reactive protein**
- **Liver enzymes**
- **Electrolytes**
- **Stool markers and cultures**

Go to pages 14 and 15 to read more about these tests.

Scheduling tests

If you are experiencing serious symptoms, your physician may want the results as soon as possible. A flexible schedule will be helpful in making yourself available for testing. Remember, there are lead times built into obtaining results of biopsies and beginning treatment. At times, diagnostic tests may be clustered together for your convenience.

You will want to work with your employer to take advantage of available sick days to cover testing requirements. If you have already utilized your available sick time, you will have to consider short-term disability or family leave. Lead times are often built into obtaining biopsy results,

which may be needed prior to treatment. Be sure to ask your questions and share your concerns with your physician during your diagnostic workup.

If the patient is your child, or a college student, make sure to speak with your child's teacher, guidance counselor, or college admissions officer to discuss any necessary school accommodations that may be required so that ongoing diagnostic testing may take place.

Questions for your doctor or nurse

1. What is the purpose of the test? What will happen if we get a positive result?
2. Do I need to fast or prepare otherwise?
3. How long will it take?
4. Will the test expose me to radiation?
5. Can I go alone or must I have a companion?
6. When will I learn the results? Who will be giving them to me? May I have a copy for my records?
7. Will we be repeating this test or procedure? How often?

Colon cancer

Patients with long-standing ulcerative colitis or Crohn's disease involving the colon are at increased risk of developing colon cancer. However, the magnitude of this risk is currently a subject of debate. The risk increases in people who have had the disease longer, have the entire colon involved, and have more inflammation present. Other risk factors include the diagnosis of colon cancer in a first-degree relative or the presence of PSC, a disease that damages and blocks bile ducts inside and outside the liver.

Despite the increased risks, only a small percentage of patients with IBD develop colon cancer. With proper treatment and monitoring

of your IBD, you should be able to maximize your chances of long-term good health.

Surveillance colonoscopy is currently the recommended strategy for detecting pre-cancerous changes or cancer in patients with IBD. During the colonoscopy, multiple biopsy specimens will be taken throughout the colon, looking for cancer or precancerous changes called dysplasia. A surveillance colonoscopy is generally recommended eight to 10 years after diagnosis of ulcerative colitis or Crohn's disease involving the colon and every one to two years thereafter. Patients who have PSC should begin surveillance colonoscopy at the time of diagnosis and then every year after that.

Chromoendoscopy

Your doctor may recommend a colonoscopy with chromoendoscopy for dysplasia surveillance. During chromoendoscopy, a blue liquid dye is sprayed over the colon surface during the colonoscopy. The blue dye collects and pools in the crevices of the colon lining, drawing attention to subtle changes in the lining of your intestine, which may be precancerous areas. Chromoendoscopy cannot be used if the colon is not clean, and it is not very effective if the colon is inflamed. Therefore, an excellent bowel preparation and control of inflammation are very important. It is common to see blue stool, and occasionally blue urine, for a short time following this procedure.

Guidelines for surveillance change over time, so you should ask your doctor about what new tests are available for the detection of colon cancer.

Other cancers

Patients with IBD are also at increased risk for other types of cancer outside of the GI tract, including skin cancers, smoking-related cancers, and lymphoma. While the risks are low,

increased risk for these types of cancers may be related to the immune suppression medications used to treat many patients with IBD. You should discuss the best surveillance strategies for these diseases with your doctor as guidelines change and new data become available.

Immunizations

Like everyone, patients with IBD should strive to keep their immunizations (vaccinations) up-to-date. This is especially true for IBD patients who take immune suppression treatments. Be sure to discuss this with your doctor on an annual basis.

Prognostic testing

As mentioned earlier, biomarkers, which are found in blood and stool, may be useful for detecting inflammation and for predicting IBD activity.

Prognostic tests assess biomarkers, in combination with other biologic factors, to predict a patient's likelihood of developing a disease or to predict the severity of disease. They have the potential to lead to improved decision-making and, ultimately, patient outcomes. Unlike diagnostic tests, they are not used to make an actual diagnosis.

The following is a list of prognostic tests that are currently available to IBD patients in the United States. Currently, these tests have not been widely adopted in clinical practice due, in part, to the need for more definitive evidence that the results are helpful in making clinical decisions. It is the Foundation's hope that, as research continues, patients will benefit from this type of test and be able to make effective, early treatment decisions to improve their health outcomes.

Please note: The Foundation does not endorse these tests and is providing this list for education and informational purposes only.

CDPATH (Takeda) is a personalized risk assessment tool that uses a blood test to help predict the potential for developing serious Crohn's disease–related complications in certain adult patients within three years. By analyzing the blood test markers, in combination with a genetic factor, date of diagnosis, and disease location, the test may determine if someone will have a low, medium, or high potential risk of developing series Crohn's disease–related complications, such as fistulas or strictures in your bowels or any bowel related surgery.

IBDX® (LabCorp) is a blood test that may predict your disease progression, likelihood for Crohn's disease complications, and the need for abdominal surgery. It looks for certain antibodies in a patient's blood—the more of these antibodies, the greater the chance of being in a high-risk group.*

**The company that developed this test was a recipient of funding from the Crohn's & Colitis Foundation. This support does not imply endorsement, recommendation, or favored product or company of the Foundation.*

PROMETHEUS® Crohn's Prognostic (Prometheus) is a blood test that measures six blood markers and three genetic markers. The patients who have more markers may be at a higher risk to develop Crohn's disease complications.

The Foundation is committed to accelerating research focused on the identification and validation of biomarkers of inflammation and on developing sensing technologies to detect these biomarkers. Learn more about the Foundation's research priorities by visiting: *www.crohnscolitisfoundation.org/research/challenges-ibd*

Special considerations

When the patient is under 18

Although IBD most typically appears in young adulthood, there are an increasing number of cases in patients under 18 years of age. Children are not miniature adults, and the process of diagnosing and treating IBD must be tailored to their biology and anatomy. You will need the advice of a pediatric gastroenterologist, a subspecialist in the field who treats IBD in children.

Symptoms of concern in children include:

- Abdominal pain
- Diarrhea
- Failure to gain weight or grow
- Fatigue
- Fever
- Rectal bleeding
- Relapsing gastrointestinal illness over several months
- Weight loss

A pediatric gastroenterologist will order the diagnostic tests and procedures that are the safest and most appropriate for your child. They will also discuss all treatment goals with you. As discussed in this brochure, your child may require ongoing laboratory tests, endoscopy procedures, and diagnostic imaging to monitor their disease and look for complications of medical therapy. As a result of these tests, the pediatric gastroenterologist may make changes to your child's medications.

Blood tests require only about two teaspoons of blood from a child, and most children do well with blood draws. If a child is anxious, formal relaxation techniques can be taught, and anesthetic creams can numb his or her arm.

Recurrent diagnostic imaging should be minimized to reduce lifetime exposure to radiation. MRIs are becoming a more common choice because they do not involve radiation; however, they may be more costly. Stool tests for lactoferrin and calprotectin may help identify patients who need additional diagnostic testing.

As with adults, colonoscopies are essential in diagnosing children. Children receive general anesthesia rather than conscious sedation used in adults. Complications are extremely rare, especially when performed in a specialized setting like a pediatric IBD center.

Keep in mind that if your child has signs and symptoms of IBD, the pediatric gastroenterologist will only order diagnostic tests that are appropriate for helping to make a proper diagnosis. It is important to understand that the risk of not knowing that your child has IBD is far greater than the risks of diagnostic testing.

Your child's physician may also direct you to counseling to support and help your child through what could be a challenging time. The Crohn's & Colitis Foundation has child-specific literature available to help you teach your child about living with IBD, and may even help them get over the fears of blood testing and procedures. Contact the Foundation's Irwin M. and

Suzanne R. Rosenthal IBD Resource Center (IBD Help Center) at 888-MY-GUT-PAIN (888-694-8872) or *info@crohnscolitisfoundation.org* for free copies of this information.

Health insurance

It is crucial to evaluate your health insurance coverage when facing the prospect of an IBD diagnosis. Levels of coverage vary, and you may want to make changes to your health insurance going forward.

High-deductible health plans may require you to absorb much of the cost of the initial diagnostic workup, including endoscopy, radiology, and laboratory work. It may be more cost-effective to pay higher premiums to reduce out-of-pocket costs if you need ongoing tests and procedures. Costs of procedures vary by location, and sometimes insurers require prior approval before you undergo a test. This is particularly true when a test of the same type is repeated within a specific time frame. It may be helpful to speak with a patient care advocate about your plan requirements.

If you are uninsured and cannot cover the cost of insurance premiums, you can look at resources available in your state and consider enrolling in a plan that permits access to the basic diagnostic requirements and treatments for IBD.

Support and resources

The IBD Help Center is a free service designed to provide you with disease-specific information, guidance, and support. It is staffed by caring information specialists who provide education on IBD management, available treatment options, and coping strategies, as well as referrals to helpful resources and programs. The IBD Help Center can be reached toll-free by phone at 888-MY-GUT-PAIN (888-694-8872) or through email (*info@crohnscolitisfoundation.org*), online live chat, social media, postal mail, or fax. The IBD Help Center is available Monday through Friday, 9 a.m. to 5 p.m. EST.

Glossary

Anti-OmpC (outer membrane protein C): an antibody to a specific protein in bacterial cell membranes, recently identified as a significant biomarker. New data shows that anti-OmpC concentrations are high among members of families that have a history of both Crohn's disease and ulcerative colitis.

ASCA (anti-saccharomyces cerevisiae): a serology test useful in distinguishing Crohn's disease from ulcerative colitis and predicting disease course.

Biomarkers: proteins in the body that may be measured by laboratory tests to assist in diagnosis and management of disease.

Biopsy: a tissue sample provided to a pathologist to help diagnose and classify disease.

Calprotectin: a stool test for intestinal inflammation that aids in predicting active disease.

CBC (complete blood count): a laboratory blood test that helps to detect anemia, infection, and inflammation.

CBir1 (anti-flagellin): this antibody may be a marker of Crohn's disease complicated by fistulas, perforations, or other serious problems.

CRP (C-reactive protein): a laboratory test that indicates non-specific inflammation in the body.

CT (computed tomography): an imaging test that uses X-rays to make detailed pictures of structures within the body.

CTE (computed tomography enterography): a variation of the CT scan where the patient swallows special contrast agents to give a sharp outline of the intestines in the X-rays.

DEXA (dual-energy x-ray absorptiometry): an X-ray that assesses the thickness of bones and risk for osteoporosis (weakened bones) and fractures.

EIM (extraintestinal manifestations): signs and symptoms outside of the gastrointestinal tract associated with IBD.

Electrolytes: laboratory test panel including serum sodium, potassium, chloride, and carbon dioxide that may indicate dehydration and other complications or medication side effects.

ERCP (endoscopic retrograde cholangiopancreatography): a type of endoscopy that utilizes X-ray to diagnose a liver disease called primary sclerosing cholangitis (PSC).

ESR (erythrocyte sedimentation rate): a laboratory blood test for non-specific inflammation.

Granuloma: a collection of cells in the intestinal lining, visible under the microscope, that indicates the body's attempt to get rid of a foreign material; sometimes seen in Crohn's disease, but not always present.

Gut: the intestine or bowel.

Hemoglobin and hematocrit: measurements of red blood cell number and volume, found in the CBC, useful in determining anemia.

Lactoferrin: a stool test for intestinal inflammation that aids in predicting active IBD.

MRCP (magnetic resonance cholangiopancreatography): a type of MRI that allows the physician to see images of the bile ducts, which are similar to ERCP images.

MRI (magnetic resonance imaging): an imaging test that uses a magnetic field and pulses of radio wave energy to take pictures of organs and structures within the body.

NUDT15 (nudix hydrolase 15): a laboratory blood test for the activity of an enzyme that helps in breaking down the medications azathioprine and 6-MP, helping to establish proper dosing of these medications.

p-ANCA (perinuclear anti-neutrophil cytoplasmic antibodies): a serology test that may aid in diagnosing ulcerative colitis, distinguishing it from Crohn's disease, and predicting disease course.

PPD (purified protein derivative): tuberculosis (TB) skin test that is advised for all patients taking biologic therapies, to assess the presence of latent and active TB disease.

Radiographic: Relating to the process that depends on X-rays.

Small bowel enteroclysis: an imaging test that evaluates the small intestine by infusing barium and air through a tube inserted into the small intestine via the nose.

Serology: a blood test to identify antibodies (proteins) that may have developed in response to an infection, other foreign proteins, or one's own proteins.

SBFT/SBS (small bowel follow-through/small bowel series): an imaging test that evaluates the small intestine and involves swallowing barium after which serial X-rays are taken.

US (ultrasound): an imaging test in which high-frequency sound waves, not heard by the human ear, are transmitted through body tissues using a transducer, relaying information to a computer for display.

Toxic megacolon: an acute condition where the colon is dilated or enlarged, a complication associated with ulcerative colitis.

TPMT (thiopurine methyltransferase): a laboratory blood test for the activity of an enzyme that helps in breaking down the medications azathioprine and 6-MP, helping to establish proper dosing of these medications.

Virtual colonoscopy (also known as CT enterography): a less invasive, new version of colonoscopy, done without sedation and using X-rays and computer-based, virtual-reality technology to produce 3-D images of the lining of the colon. Virtual colonoscopy is not currently used to diagnose or monitor IBD.

About the Crohn's & Colitis Foundation

Established in 1967, the Crohn's & Colitis Foundation is a non-profit, volunteer-fueled organization dedicated to finding cures for Crohn's disease and ulcerative colitis and improving the quality of life of children and adults affected by these diseases.

Since our founding, the Foundation has remained at the forefront of research in Crohn's disease and ulcerative colitis. Today, we sponsor basic and clinical studies of the highest quality, nurture investigators at the early stages of their careers, and finance underdeveloped areas of research.

We also provide a comprehensive series of education programs, printed and online resources, support services, and advocacy programs to members of the IBD community, including patients and caregivers.

We can help! Contact us at:

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Design & Layout:
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This educational material is made possible by support from Takeda Pharmaceuticals U.S.A., Inc.

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The Crohn's & Colitis Foundation is a nonprofit organization that relies on the generosity of private contributions to advance its mission to cure Crohn's disease and ulcerative colitis, and to improve the quality of life of children and adults affected by these diseases.

11/2021