

LABORATORY TESTS RELATED TO INFLAMMATORY BOWEL DISEASES (IBD)

WHAT ARE INFLAMMATORY BOWEL DISEASES?

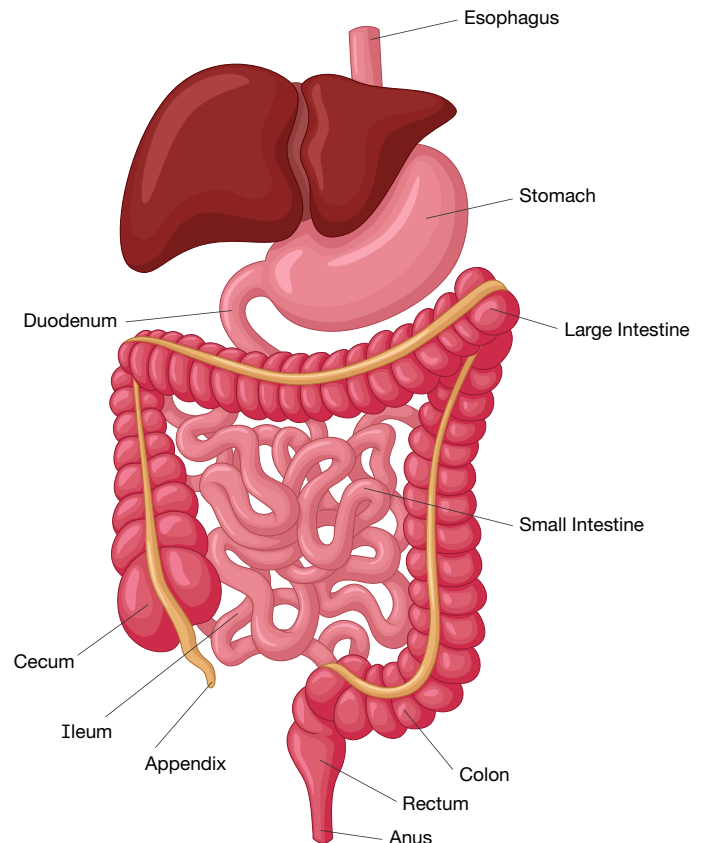
Inflammatory bowel diseases are a group of conditions that describe diseases that involve chronic inflammation of the digestive tract. Two of the most common inflammatory bowel diseases are Crohn's disease and ulcerative colitis. The symptoms for Crohn's disease and ulcerative colitis are very similar so multiple lab tests are required to properly diagnose them. Crohn's disease and ulcerative colitis are chronic conditions that currently do not have a cure.

CROHN'S DISEASE

Crohn's disease is a condition that causes chronic inflammation of the gastrointestinal tract. The disease causes the small and large intestines to become irritated and swollen. The symptoms include diarrhea, stomach cramps, abdominal pain, fatigue, blood in stool and reduced appetite. There are several factors that contribute to the development of Crohn's disease such as a genetics and a weakened immune system.

ULCERATIVE COLITIS

Ulcerative colitis is a chronic inflammatory bowel disease that affects the digestive tract. It causes inflammation and sores in the colon and the rectum. The symptoms include rectal pain, diarrhea often mixed with blood or pus, abdominal pain and cramping, weight loss and fatigue. There are four main types of colitis that depend on the location of the affected area.



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LEFT-SIDED COLITIS: Inflammation occurs in the rectum, lower end of the colon and the descending colon. Signs and symptoms include bloody diarrhea, abdominal cramping and pain on the left side, and the urge to pass stool.

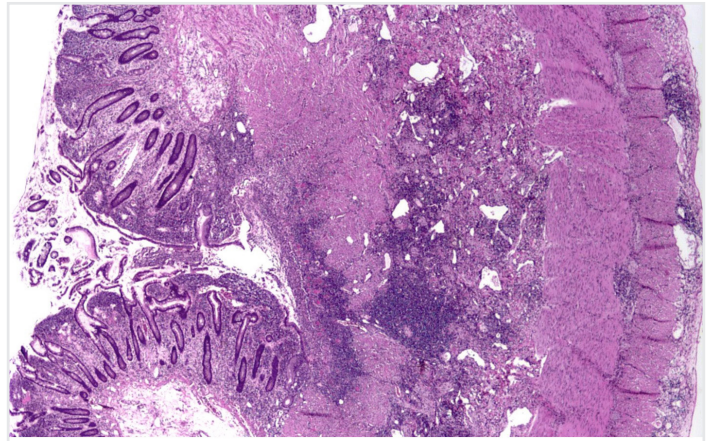
PANCOLITIS: Inflammation occurs in the entire colon. Symptoms include bloody diarrhea, fatigue, weight loss and abdominal pain and cramping

PROCTOSIGMOIDITIS: The rectum and the lower end of the colon (sigmoid colon) are the inflamed areas. Symptoms include bloody diarrhea, difficulty passing stool despite the urge and abdominal pain and cramps.

ULCERATIVE PROCTITIS: The rectum is the only inflamed area and rectal bleeding may be the only sign of the condition.

IBD AND COLON CANCER

Inflammatory bowel diseases can increase the risk of colon cancer. Ulcerative colitis and Crohn's disease cause chronic inflammation of the colon which may result in dysplasia. Dysplasia is the abnormal growth of cells that may develop into cancer over time. Frequent colon cancer screenings for people with IBD are important for early detection.



UNDER THE MICROSCOPE

A low magnification view of a piece of colon under the microscope in a patient with Crohn's disease shows somewhat normal mucosa (surface) on the left at the top and the bottom with a eroded lesion (center) with underlying inflammation (dark purple areas). Finding normal mucosa interrupted by these lesions are called, "skip lesions" and are indicative of Crohn's.

LAB TESTS RELATED TO INFLAMMATORY BOWEL DISEASES

**Please note that reference ranges are set by individual laboratories for their specific populations so reference ranges might differ slightly.*

BLOOD TESTS

ALBUMIN: This test measures the levels of albumin in the blood. This test is important because very low levels or very high levels of albumin are a sign of a possible health condition. This test can be used to determine whether symptoms are related to IBD or a nutritional deficiency. The typical reference ranges* are between 3.4-5.4 g/dL.

ANTI-TISSUE TRANSGLUTAMINASE (ANTI-TTG): This test measures the level of anti-tissue transglutaminase antibodies that are present in the blood. This test is important because high levels of anti-tTG antibodies is a sign of celiac disease and it is not linked to IBD. It may be ordered to exclude celiac disease in a person with symptoms that may overlap with IBD. The typical reference ranges* are;

Negative: 3U/mL

Weak Positive: 4-10 U/mL

Positive: 11 U/mL

COMPLETE BLOOD COUNT: This panel determines your overall health status by looking at your overall blood count levels, including your red and white blood cell count, your platelets, and lymphocytes. This test is important because it can indicate if you are having a condition or disease, such as an infection, anemia, inflammation, or cancer.

COMPREHENSIVE METABOLIC PANEL: This panel includes the components of a Basic Metabolic panel, which measures the current status of your metabolism, including glucose, electrolyte, kidney function, and fluid balance, with additional measures related to liver activity and function. This panel is important because your body tightly regulates your physiology and these values quickly indicate when there is a problem.

C-REACTIVE PROTEIN (CRP): This test measures the level of C-reactive protein in the blood. This is important because high levels of CRP are a sign of inflammation in the body. The typical reference range* is less than 10mg/L.

CYTOMEGALOVIRUS TEST (CMV): This tests measures the presence of CMV antibodies in the blood. This test is important because a positive test for CMV infection can worsen symptoms for IBD patients.

ERYTHROCYTE SEDIMENTATION RATE (ESR): This test measures how quickly erythrocytes (a type of red blood cells) separate from the plasma and sink to the bottom of a test tube. This test is important because a fast fall rate indicates inflammation in the body, which can be a sign of IBD. The typical reference range* for men is between 0-22 mm/hr and 0-29 mm/hr for women.

FERRITIN: This test measures the levels of ferritin, a protein that stores iron, in the blood. This test is important because very low and very high levels of ferritin in the blood can be a sign of inflammatory conditions such as IBDs. The typical reference ranges* for adult males are between 20-250 ng/mL and 10-120 ng/mL for adult females.

IRON-BINDING CAPACITY (UIBC): This test measures the amount of transferrin in the blood that is not attached to iron. This test is important because it indicates an iron deficiency that may be caused by anemia which may be a side effect of inflammatory bowel disease. The typical reference range* is between 111-343 mcg/dL.

SERUM IRON/SERUM FE: This test measures the level of iron in the blood. This test is important because low or high iron levels are a sign of deficiencies in the body and can help diagnose the condition. The typical reference range* is between 60-170 mcg/dL.

TRANSFERRIN CAPACITY (TIBC): This test measures the blood's ability to attach to iron and move it around the body. This test is important because low levels of TIBC can be a sign of inflammation in the body such as IBD. The typical reference range* is between 240-450 mcg/dL.

VITAMIN B12 LEVEL: This test measures the level of the vitamin B12 found in the blood. This test is important because low levels help identify nutrient absorptions deficiencies and can indicate anemia. The test indicates if symptoms are not related to IBD. The typical reference ranges* are between 160-950 pg/mL.

VITAMIN D TEST (25-HYDROXY VITAMIN D TEST): This test measures the amount of 25-hydroxy vitamin D in the blood. This test is important because it is used to screen for fat soluble vitamin deficiencies which are common in Crohn's patients. The typical reference range* is between 20 and 40 ng/mL.

TYPICAL REFERENCE RANGES FOR MEN*:

Complete Blood Count	Role in Health	Typical Reference Range*
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Hematocrit	Plasma in Red Blood Cells	38.3-48.6%
Hemoglobin	Oxygen-Carrying Protein	13.2-16.6 grams/dL
Platelet Count	Blood Clotting	135-317 x 103 /uL
Red Blood Cell Count	Carry Oxygen	Between 4.35-5.65 x 106 /uL
White Blood Cell Count	Fight Infections	3400-9600 cells/uL

TYPICAL REFERENCE RANGES FOR WOMEN*:

Complete Blood Count	Role in Health	Typical Reference Range*
Hematocrit	Plasma in Red Blood Cells	35.5-44.9%
Hemoglobin	Oxygen-Carrying Protein	11.6-15 grams/dL
Platelet Count	Blood Clotting	157-371 x 103 /uL
Red Blood Cell Count	Carry Oxygen	Between 3.92-5.13 x 106 /u
White Blood Cell Count	Fight Infections	3400-9600 cells/uL

Additional Tests	Role in Health	Recommended Reference Ranges*
Alanine Transaminase (ALT)	Convert protein into energy	7-55 U/L
Albumin	Protein made by the liver	3.4 to 5.4 g/dL
Alkaline Phosphatase (ALP)	Breaking down proteins	40-129 U/L
Aspartate Transaminase (AST)	Metabolize amino acids	7-48 U/L
Bilirubin	Substance produced by liver to aid in digestion	0.1-1.2 mg/dL
Total Protein	Proteins including those that help fight infections	6.3-7.9 g/dL

BOWEL AND STOOL TESTS

BOWEL BIOPSY: This test is procedure where a small portion of the bowel lining is removed during a colonoscopy in order to be examined. This test is important because it helps diagnose inflammatory bowel diseases and differentiate between Crohn's disease and ulcerative colitis.

CALPROTECTIN: This test measures the levels of calprotectin, a protein produced by neutrophils (a type of white blood cell) in the stool. This test is important because high levels of calprotectin in the blood are a sign of inflammation in the digestive tract. The typical reference range* is less than 50 mcg/g

CLOSTRIDIUM DIFFICILE: This test measures the presence of clostridium difficile bacteria in stool. This test is important because high levels of clostridium difficile are an indication of infection in the digestive tract such as Crohn's disease or ulcerative colitis.

FECAL BILE ACID TEST: This test measures the level of bile acids in the fecal sample. This test is important because it helps diagnose bile acid malabsorption which causes diarrhea in patients with IBD, particularly Crohn's disease with prior ileal resection (a removed or malfunctioning ileum). The typical reference range* for bile acids is less than 2619 mcmoles/48 hours.

LACTOFERRIN: This test measures the levels of lactoferrin, a protein made by neutrophils, in stool. This test is important because high levels of lactoferrin in the stool are a sign of inflammation in the digestive tract and it helps differentiate between IBDs and non-inflammatory bowel diseases. The typical reference range* is less than 7.25 µg/g.

OVA AND PARASITE (O&P): This test measures whether there is a parasite present in the digestive tract by analyzing a stool sample. This test is important because the presence of parasite ova (parasite eggs) in the stool are a sign of a parasite infection and not IBD.

STOOL WHITE BLOOD COUNT (STOOL WBC): This test is used to detect white blood cells in a stool sample. This test is important because the presence of white blood cells is a sign of an infection in the digestive tract and it is a sign of IBDs. A positive result indicates the presence of white blood cells in the stool and a negative result indicates that there are no white blood cells in the stool.

ANTIBODY TESTING

Antibody tests are blood tests that measure for proteins that are produced by the immune system. These tests are used to determine whether a person has Crohn's disease or ulcerative colitis.

CLOSTRIDIUM SPECIES ANTIBODIES (ANTI-CBIR1): This test measures the presence of clostridium difficile bacteria. This test is important because high levels of clostridium difficile are an indication of infection in the digestive tract such as Crohn's disease or ulcerative colitis

ESCHERICHIA COLI ANTIBODIES (ANTI-OMP C): This test measures the presence of Escherichia coli antibodies. This test is important because high levels of Escherichia coli antibodies can indicate the progression of Crohn's disease.

PERINUCLEAR ANTI-NEUTROPHIL CYTOPLASMIC ANTIBODY (PANCA): This test measures the amount of autoantibodies that are in the blood. This test is important because it helps differentiate between Crohn's disease and ulcerative colitis. A positive test is usually a sign of ulcerative colitis with about 80% of patients of UC patients testing positive and only about 20% of Crohn's disease patients testing positive. The typical reference ranges* are;

Negative: ≤19 AU/mL

Equivocal: 20-25 AU/mL

Positive: ≥ 26 AU/mL

PSEUDOMONAS FLUORESCENS ANTIBODIES: This test measures the presences of pseudomonas fluorescens antibodies. This test is important because it can help differentiate between Crohn's disease and ulcerative colitis. The test is positive in 55% of Crohn's disease cases and 10% of ulcerative colitis cases.

SACCHAROMYCES CEREVISIAE ANTIBODIES (ASCA) IGG: This test measures the presence of anti-saccharomyces cerevisiae antibodies (ASCA) IgG (immune proteins). This test is important because it helps tell the difference between Crohn's disease and ulcerative colitis. A positive test, together with another positive antibody test such as pANCA, is usually a sign of Crohn's disease. A positive test of ASCA IgG is also an indicator of the severity of the disease. The typical reference ranges* are;

Negative: ≤ 20 U

Equivocal: 20.1-29.9 U

Positive: ≥ 30 U

SACCHAROMYCES CEREVISIAE ANTIBODIES (ASCA) IGA: This test measures the presence of anti-saccharomyces cerevisiae antibodies (ASCA) IgA (immune proteins). Its function is similar to the test above. The typical reference ranges* are;

Negative: ≤ 20 U

Equivocal: 20.1-29.9 U

Positive: ≥ 30 U

NON-LABORATORY TESTS

ABDOMINAL X-RAY: This test takes a picture of the abdomen to view the digestive tract. This test is important because it helps determine whether there is a blockage in the intestines and it used to look for signs of inflammatory bowel diseases.

COLONOSCOPY: This test examines the colon (large intestine) and rectum for any abnormal changes using a colonoscopy, which is a long tube with a camera at the tip. This test is important because it helps determine the causes of IBD symptoms and screens for colon cancer.

COMPUTED TOMOGRAPHY (CT SCAN): This test, similar to an abdominal x-ray, is used to view the digestive tract. This test is important because it provides more detail than x-rays and can indicate the presence of abscesses (pockets of pus) in the digestive tract which can be a sign of IBD.

SIGMOIDOSCOPY: This test examines the rectum and the lower part of the colon using a sigmoidoscope which is a flexible tube with a small camera that is inserted through the anus. This test is important because it helps monitor IBD by measuring the inflammation levels and can be used to detect signs of bowel cancer.

X-RAY WITH BARIUM: This test is used to detect diseases by using barium to show any abnormalities in the digestive tract. This test is important because it can determine whether the cause of illness is IBD or a perforated colon.

ASK YOUR DOCTOR

- What part of the intestine is affected?
- What dietary changes should I make?
- Are there any lifestyle changes I should make?
- What are my treatment options?
- Is there a difference between IBD and IBS?
Can I have both?
- How frequently should I get colonoscopies?
- What other lab tests should I get?
- How should I prepare for the screening tests?

MEET ANTHONY



“I wish patients could understand the level of precision and complexity that happens routinely in busy clinical labs or hear a group of pathologists work through a difficult case under the microscope.”

Anthony was diagnosed with Crohn’s disease at age 18, after experiencing bouts of diarrhea, fatigue and intense abdominal pain since he was 12. As a kid, he didn’t know what IBD was and because he felt embarrassed, he spent years hiding his symptoms from his family. As he got closer to going to college, he realized that he would not be able to finish college and enjoy the experience without seeking help to manage his symptoms. After his diagnosis, he grew an appreciation for the work that of laboratory professionals and pathologists. The laboratory test results played a crucial role in determining the effectiveness of his treatment plan and being able to live his life to the fullest. Anthony is now a doctor himself and considered pathology as his specialty because of the impact it had on his life.

To learn more and to watch a video about Anthony, go to www.ascp.org/patients

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