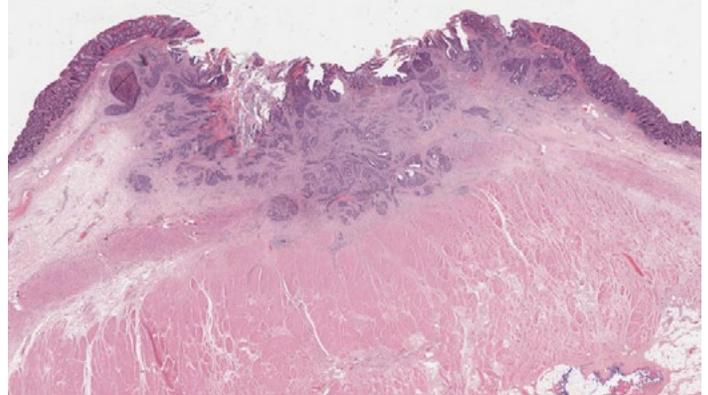


LAB TESTS RELATED TO COLON CANCER

WHAT IS COLON CANCER?

Colon cancer develops in the tissue of the colon (*also known as the large intestine*). The colon has glands which produce a lubricant for digestive material. In individuals over 45 it is fairly common for those glands to form a growth called a polyp. While most polyps are not particularly dangerous, they can become cancerous. Certain traits about the polyps change the likelihood that they develop into cancer. For example, individuals with more than 3 polyps or a polyp greater than 1 centimeter in size are especially at risk of developing cancer. When a colon polyp becomes cancerous, it may spread throughout the colon tissue and to other parts of the body. Thankfully, regular screening of the colon in individuals 45 and older or at high-risk for developing colon cancer can lead to earlier, more effective treatment. Physicians can remove at-risk polyps before they develop cancer and treatment tends to be more effective on colon cancer which is caught early in its development. As it generally takes years for a polyp to develop cancer, regular colon screenings and laboratory testing are essential to risk mitigation and cancer treatment.

UNDER THE MICROSCOPE



Picture Legend: Invasive colon cancer is present in the center of this cross section of colon showing dark blue to purple clusters of malignant glands invading down from the top of the image through multiple normal levels of the colon wall. On either side of the cancer are normal structures including four layers. Note that the cancer cells penetrate the fourth layer, a feature which is used in staging the cancer.

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STAGES OF COLON CANCER

The stage of colon cancer corresponds to the extent to which it has spread throughout the body and relates to the severity of the cancer. The stages of colon cancer range from 0 to IV:

STAGE 0: Cancerous cells are present in the inner colon wall (mucosa)

STAGE I: The cancer is present in the innermost layers of the colon (mucosa and submucosa), but has not spread elsewhere.

STAGE II: The cancer has spread to other layers in the colon and may be affecting the outer wall of the colon (serosa), but has not spread to the lymph nodes or other parts of the body.

STAGE III: The cancer has spread outside of the colon and into the lymph nodes, but not to other parts of the body.

STAGE IV: The cancer has spread outside of the colon and into other parts of the body. It may be present in the lymph nodes, but does not have to be.

Within each of the stages of colon cancer are additional subcategories that describe specific aspects of the cancer. Those are not discussed here, but your doctor will be able to help you understand your specific diagnosis.

TESTING TO IDENTIFY COLON CANCER

There are many tests associated with identifying colon cancer, but two of the most common are visual examinations and stool-based tests. Visual examinations, generally using an x-ray or small camera probe (colonoscopy), do not need to be conducted as frequently as stool-based tests for screening purposes, but some patients consider them invasive or uncomfortable. As an alternative, laboratory tests can be conducted to look for evidence of colon cancer. Stool (feces) is analyzed for evidence of abnormalities in its composition, like traces of blood, which are associated with colon cancer. Three of the most common stool-based screening tests are described here, but a physician may order alternative or additional tests as well.



THE MOST COMMON LABORATORY TESTS FOR IDENTIFYING COLON CANCER:

Fecal Immunochemical Test (FIT): This test involves taking a stool sample and testing it for traces of blood. When there are cancerous polyps in the colon, it is common for them to be damaged and undergo some bleeding. While this blood tends not to be abundant enough for the patient to notice, the FIT can identify small traces of it in the stool. If blood is found, the physician will order additional tests to confirm that it is related to colon cancer. This test does not require a change in the patient's diet, but may require them to avoid certain medications. As a screening test for colon cancer, the FIT must be conducted annually.

Guaiaac-based Fecal Occult Blood Test (gFOBT): This test involves taking a stool sample and introducing it to a chemically-reactive test sheet. If there is blood in the stool, the test sheet will change to a blue color. It is not as common as the FIT, and may require changes to the patient's diet for the week leading up to the test. As a screening test for colon cancer, the gFOBT must be conducted annually.

Stool DNA Test: This test involves taking a stool sample and analyzing it for atypical DNA associated with cancer. It may also be used to test for traces of blood in the stool, like the FIT and gFOBT. If atypical DNA and/or blood is found in the sample, then the physician will order additional tests to confirm that it is related to colon cancer.



ADDITIONAL LABORATORY TESTS RELATED TO DIAGNOSING AND TREATING COLON CANCER

Biopsy: Biopsy is the removal of tissue for analysis in the laboratory. If polyps are found during a colonoscopy, it is common for the physician to remove them and send them to a laboratory for analysis. At the laboratory, the tissue will be examined under a microscope for evidence of cancer. During this process, the pathologist will also be able to grade the cancer, from stage 0 to stage IV. These classifications correspond to the extent that the cancer has spread. In stage 0 colon cancer, the cancer remains in the inner lining of the colon. In stage IV colon cancer, it has spread to other organs throughout the body. This information is essential in creating the most effective treatment plan for each individual case of colon cancer.

Genetic and Antigen Testing: In addition to biopsy, the physician may order additional laboratory testing to assist in delivering the most accurate diagnosis and prognosis. These tests are generally supplemental and not necessary in all cases.

Carcinoembryonic Antigen Test (CEA): This is a blood test which looks for elevated amounts of specific antigens in the patient's blood. The carcinoembryonic antigen being tested for has been found to correlate with the stage of colon cancer. By determining how much of the antigen is in a sample of blood, the pathologist can use that information to assist in determining the stage of colon cancer. This test is only used after a diagnosis of colon cancer has been reached, since other phenomena could cause elevated CEA.

Genetic Tests: These tests look for evidence of genetic abnormalities in tumors. For example, a gene called *braf* makes the BRAF protein which regulates cell growth. In individuals with a mutated *braf* gene, cells may grow out of control, leading to cancer. If specific genetic abnormalities are found, then it will affect the treatment prescribed to the patient.

QUESTIONS TO ASK YOUR DOCTOR

- What screening test do you recommend for colon cancer?
- How often should I be screened for colon cancer?
- How should I prepare for my screening test?
- What is the course of action based on my lab results?
- What are all my treatment options?
- Why do you recommend this particular treatment option?
- How do we know the procedure was successful/what lab tests and which results indicate a successful procedure?
- What are the markers we are monitoring? What are the levels we are hoping for? What happens if the markers are higher than we would like to see?
- What are the follow-up tests and what are we looking for?
- Are there additional tests, such as antigen or genetic tests, which could be used to better understand my disease and prognosis?

“Laboratory professionals and pathologists help doctors make accurate diagnoses—and where would we be without that?”

MEET REBECCA

Rebecca lost her husband to cancer and her sister is a pathologist, but when she began to experience unexplained stomach pains, she never thought it would lead to a cancer diagnosis. After undergoing a colonoscopy, her doctor responded almost immediately that she had colon cancer. Rebecca was stunned by her diagnosis and frightened about the unknown outcome. She underwent radiation treatments at the University of New Mexico and took a chemotherapy drug every day to augment the treatment. She also had once a week chemotherapy treatments in Albuquerque, which required a blood draw at each visit. The laboratory would check her levels to make sure she was able enough to have the chemotherapy treatment. The treatments weren't easy, but Rebecca finished her course in September 2009 and 10 weeks later, after a PET scan, was pronounced tumor-free.

“Without lab professionals and pathologists, I think modern medicine would be in a world of hurt these days.”



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