

Colon Cancer

Why is Colon Cancer an emerging public health issue?

Cancer of the colon and rectum (colorectal cancer) is the second leading cause of cancer related deaths in the United States. In 2000, the American Cancer Society estimates that there will be 93,800 new cases of colon cancer in the United States, and 47,700 deaths related to colon cancer.

Prevention and early detection are key factors in controlling and treating colon cancer. Colon cancer can be prevented and the number of deaths reduced by removing pre-cancerous polyps, which may be present in the colon for years before invasive cancer develops. Treating cancer in its early stages is critical.

Despite the availability of effective screening tests, colon cancer screening is underused. Studies show that only 37% of colorectal cancers are detected at an early (localized) stage [Rachel: incomplete sentence—what is the message? I am not sure over the confusion here. The message is that currently only 37% of such cancers are detected at an early stage. This number would be higher if individuals were aware of the risk factors associated with the cancer and fully understood the importance of early detection and treatment]. This finding underscores the need to increase awareness of the effectiveness of screening and to promote the widespread use of colon cancer screening at regular intervals.

About 80% of individuals with colorectal cancer have sporadic disease, with no apparent evidence of having inherited the disorder. The remaining 20% of individuals have a family history of colorectal cancer, which suggests either a genetic contribution, common exposures among family members, or gene-environment interactions. Gene-environment interactions means a combination of genes and exposures. Currently known gene changes for an inherited risk for colon cancer accounts for 5-6% of cases.

Presently, genetic testing for colon cancer is not a required component for screening. The question is whether screening for colon cancer should be modified to include genetic testing.

What is Colon Cancer?

Cancer is not just one disease, but rather a group of diseases. All forms of cancer cause cells in the body to change and grow out of control. Most cancers are named after the part of the body where the cancer first starts. Colon cancer begins in the colon, also known as the large intestine, which is part of the digestive tract. The colon absorbs water and nutrients from food and also serves as a storage place for waste matter. The colon is divided into four sections, the ascending colon, the transverse colon, the descending colon, and the sigmoid colon. Cancer can develop in any of the four sections of the colon.

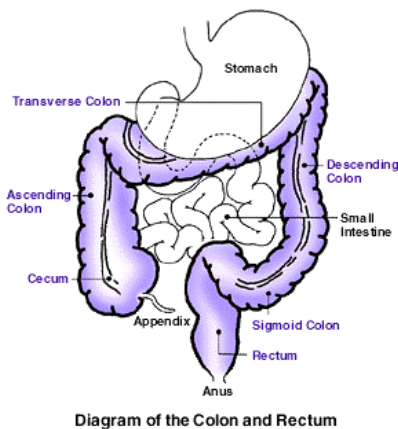


Figure 1. Diagram of the Colon and Rectum

Before cancer develops, there are often earlier changes in the lining of the colon. One type of change is a growth of tissue called a polyp. Polyps of the colon are almost always benign and usually produce no symptoms. With time, polyps can turn into cancer.

Ninety-five percent of colon cancers are adenocarcinomas. These are cancers of the cells that line the inside of the colon. There are some other more rare types, but the facts given refer to adenocarcinomas.

Colon cancer affects men and women equally. Risks for developing colon cancer generally increase with age. Ninety-three percent of cases occur in people over 50.

What are the symptoms of colon cancer?

- Symptoms may be few, if any at first. It is possible to have colon cancer and not have any symptoms. Common symptoms of colon cancer include:
- A change in bowel habits
- Diarrhea or constipation
- Blood in the stool (bright red, black, or very dark)
- Narrowed stools (about the thickness of a pencil)
- Bloating, fullness or stomach cramps
- Frequent gas pains
- A feeling that the bowel does not empty completely
- Weight loss without dieting
- Chronic fatigue

Because these symptoms are also associated with many other disorders, it is important to see a doctor if any of these symptoms occur, especially because early detection makes successful treatment more likely.

- Individuals with an increased risk for colon cancer include:
- Family or personal history of colon cancer
- Personal history of polyps (not all polyps increase risks for cancer)
- Personal history of inflammatory bowel disease, such as ulcerative colitis or Crohn's colitis
- Age over 50
- Diet (foods high in fat, especially from animal sources, and low in fruits and vegetables increase risks for colon cancer)
- Obesity and lack of exercise

To reduce the risks of colon cancer it is recommended to eat plenty of fruits, vegetables, and whole grain foods. High fat, low-fiber foods should be avoided. Regular exercise is important. Some studies suggest that calcium-rich foods, daily multivitamins containing folic acid or folate, and daily aspirin intake may lower the risk of colon cancer.

What causes colon cancer?

While environmental factors can contribute to risks for cancer, most cancers have a genetic basis as well. Colon cancer is one of the most common inherited cancer syndromes. Currently, there are several forms of hereditary colon cancer, including hereditary non-polyposis colorectal cancer (HNPCC), familial adenomatous polyposis (FAP), and familial colorectal cancer. These cancers are inherited in an autosomal dominant fashion.

Rachel: we many need to revise the following a bit?

Autosomal dominant inheritance means only one gene change is necessary for a condition to express itself. Remember that we have two genes for all our health factors. A change in one of those factors is necessary for dominant condition to occur. Each offspring of an individual with a dominant condition has a 50% chance of inheriting a significant susceptibility for developing colorectal cancer.

Hereditary non-polyposis colon cancer

Hereditary non-polyposis colon cancer, or HNPCC, accounts for 4-5% of all colorectal cancers. HNPCC is caused by changes in the genes that correct mistakes in the DNA during the growth and multiplying of cells. These genes are called DNA mismatch repair genes. People who inherit HNPCC have between a 30-70% chance of developing colon cancer during their life. The cancer usually appears between the ages of 35 and 45, and is usually located in the right colon when it first develops.

A person with HNPCC does not tend to develop large numbers of polyps in their colon. However, any polyps that do develop tend to become malignant cancer much more quickly than in other people, usually in three to five years.

Although scientists have discovered the genes associated with HNPCC, the test for these genes can only find out if a person has the syndrome about half of the time. Because of this, the only good way to determine if a person has HNPCC is to look at how many people in the patient's

immediate family also have HNPCC. If a person does have HNPCC in their family, they should begin having colorectal cancer screening starting at age 25.

One type of HNPCC hereditary colon cancer is called Lynch syndrome. Individuals with HNPCC gene changes have an estimated 80% lifetime risk of developing cancer. (Already mentioned) HNPCC increases the risk for other cancers.

HNPCC or FAP Move to first paragraph under What causes colon cancer? An alteration in the APC gene termed I1307K has also been described. The variant is found in ~6% of people of Ashkenazi Jewish descent, and appears to be associated with an approximately twofold increase in colorectal cancer risk. I1307K testing is done by ASO technology. The age at which to screen is not known.

Familial adenomatous polyposis

A change in the APC gene on chromosome 5 is responsible for familial adenomatous polyposis, or FAP. APC is a gene that normally suppresses the growth of colon tumors and its protein product is thought to play a role in control of the cell cycle by regulating the expression of other genes. FAP is one of the most clearly defined and well understood among the inherited colon cancer syndromes. Many people with FAP will end up developing cancer before they turn 40, and almost everyone with this gene change will have colorectal cancer by the age of 50. However, FAP accounts for less than 1 percent of all colorectal cancers.

People with FAP develop hundreds and sometimes thousands, of polyps in their colons, greatly increasing the chances that some of them will become cancerous. The polyps first appear when a person is still a teenager, with symptoms typically starting around the age of 25. The most common symptoms of FAP include rectal bleeding, rectal obstruction, anemia and an almost constant lack of energy, or malaise.

Today there is a test available to detect the gene that causes FAP. People who have the gene should have one of the tests for detecting polyps and colorectal cancer every few years beginning at age 10 or 12.

The prevalence of FAP is 1 in 8,000. There is no clear consensus when to begin surveillance for growths; however, screening usually begins in the teenage years.

Gardner's syndrome

Gardner's syndrome results in polyps and colorectal cancers that develop at a young age. It can also cause benign (not cancerous) tumors of the skin, soft connective tissue and bones.

Familial colorectal cancer

Familial colorectal cancer may be caused by a number of genetic changes that seem to result in the development of colorectal cancer at a younger age than the general population. Because of this early start, people with familial colorectal cancer have a 10-percent risk of developing cancer during their life. This is about double the 'usual' rate of colorectal cancer.

How is colon cancer detected?

If there is reason to suspect colon cancer, a complete medical history and physical exam may be performed. Additional tests are done to determine if the disease is present and to determine its stage.

Digital Rectal Exam (DRE)

During a DRE exam, the doctor or health care provider inserts a gloved finger into the rectum to feel for anything not normal. This test can only inspect a limited area and is therefore not a recommended as an acceptable screening method.

Fecal Occult Blood Test (FOBT)

The FOBT is the most common and inexpensive colon cancer-screening device. In this context, the word *occult* means *hidden*. A stool sample is taken and is chemically tested in a lab for traces of blood that normally can not be seen. Although this test is important, it should not alone be used as a diagnosis for colon cancer as false positive results may occur.

Flexible Sigmoidoscopy

A sigmoidoscopy involves the insertion of a slender, lighted tube into the rectum. The inside of the rectum and part of the colon can be viewed for cancer or polyps. This test only exams about a third of the colon and may therefore miss cancers or polyps of the upper colon.

Colonoscopy

A colonoscopy involves a long, flexible tube that is inserted through the rectum into the colon. This tube is long enough to reach the full length of the colon. The tube is linked to a video camera. If a mass or any other type of abnormal area is seen, a sample can be taken for further examination in a lab. This test is reliable because it visualizes the entire colon and offers the opportunity to remove many growths during the exam. Although a colonoscopy is safe, there is a small risk of injury to the colon.

Barium Enema (double contrast barium enema or barium enema with air contrast)

The double contrast barium enema provides the physician with an indirect way to visualize the colon. An enema of a chalky substance, with the dye barium, is administered to the patient to partly fill up and open the colon. Air is then added to further open the colon. The barium outlines the intestine, and can be viewed by X-rays. Barium Enema is likely to identify larger polyps and growths with a 50% or better accuracy. It is less likely to pick up smaller growths that are in the most curable stage.

DNA testing (Rachel: please add more on the APC gene See above under FAP section)

APC testing is now commercially available. Oncology researchers and clinicians have been striving to create useful guidelines for testing of HNPCC. These guidelines can be viewed at “When to Consider Genetic Testing for Hereditary Colon Cancer”

The [American Cancer Society](#) recommends guidelines for the early detection of colon cancer. Men and women who are at average risk for colon cancer with no symptoms, beginning at the age of 50, should follow one of the three screening options:

- Yearly fecal occult blood test plus sigmoidoscopy every 5 years
- - OR -
- Colonoscopy every 10 years

- OR-

- Double contrast barium enema every 5-10 years

A DRE should be performed at the time of each of these screenings.

Individuals at higher risk for colon cancer should begin screening earlier and have it more often.

If colon cancer is suspected, a CT scan, MRI, angiography, and ultrasound may be performed.

How is colon cancer treated?

Treatment of colon cancer includes surgery, radiation therapy, and chemotherapy. Surgery is the most common treatment for all stages of colon cancer. Treatment for colon cancer largely depends on the stage of the cancer. Staging is the process that tells the doctor whether the cancer has spread and how far.

More than one system is used for staging colon cancer. These include the Dukes, Astler-Coller and American Joint Committee on Cancer (AJCC/TNM) systems. The Dukes system uses the letters A through C, and the Astler-Coller system uses A through D. The AJCC/TNM system uses the Roman numerals O through IV. All three systems describe the spread of the cancer in relation to the layers of the wall of the colon, organs next to the colon, and other organs farther away.

The AJCC/TNM system and corresponding Dukes and Astler-Coller stages can be found at [InteliHealth](#). The treatment recommendation for each stage is given. Studies of promising new or experimental treatments in patients are known as clinical trials. A clinical trial is only done when there is some reason to believe that the treatment being studied may be of value to the patient. Treatments used in clinical trials are often found to have real benefits.

Information and Support Resources

- [The American Cancer Society Colon and Rectum Cancer Resource Center](#)
- [CDC: Cancer Prevention and Control of Colorectal Cancer](#)
- [OncoLink: University of Pennsylvania Cancer Center](#)
- [Colon Cancer Alliance](#)
- Colon and Rectal Cancer: Treatment Guidelines for Patients: [Oncology.com](#)